
EX LIBRIS
AMERICAN FOUNDATION FOR THE BLIND INC.

"Sight Begins at Forty"

Ellice M. Alger, M.D.

THE eyes of the middle-aged are subject to many diseases and changes, yet, if properly cared for, they may be as efficient as they ever were in youth.

MOST people enter the period of middle life with a feeling of profound discouragement. They are increasingly conscious that they can no longer do things as well or as easily as they once did and the joy of accomplishment has gone out of them. Ambitions have failed of realization or have proved disappointing. Health itself instead of being effortless and automatic requires a conscious or subconscious attention that it never did before. Professor Pitkin, who wrote the book, *Life Begins at Forty*, did a great service to humanity when he pointed out the compensations and even the advantages of middle life, and no better proof could be asked of the universality of the need than the fact that the book has been a "best seller" over a period of years.

One of the most discouraging things about the whole period is the gradual failure of the eyes, which are a very essential factor in a contented and useful middle age. For age brings its own eye problems quite different from those of youth. The eyes tire sooner than they did and vision is not so automatically clear. The acute inflammations and infections are not so common as in youth, but they have a greater tendency to become chronic. It takes longer to get over things; exudates absorb more slowly and repair takes longer; recurrences are more frequent; until finally we may have a whole line of degenerative changes not occurring in youth, which we have been accustomed to speak of as senile. They interfere with our comfort and sometimes lessen our vision. And finally there is the dread of the loss of sight itself, of which we become increasingly fearful.

But the picture is not by any means as drab as it seems. As a matter of fact much can be done to mitigate these discomforts and postpone these changes and cure these diseases. Properly cared for, the eyes of the elderly are often more efficient and less troublesome than they ever were in youth. It might almost be possible to paraphrase Professor Pitkin's famous title and say that "Sight Begins at Forty!"

Loss of Accommodation With Age

The young child has the keenest of distance vision and at the same time he can thread a tiny needle or read the finest print held within three or four inches of the eyes. He can do this because he has a lens in his eye as clear as crystal and as elastic as live rubber, so that it adjusts to near or far vision without effort. As he gets older the lens remains transparent, but it becomes more and more inelastic. He still sees perfectly at a distance but his near point recedes steadily. By the time he is forty-five he can just about read fine print. He begins to hold his book farther away than is comfortable, and laughingly says that his eyes are all right but his arms are too short. He requires stronger and stronger light. If he is compelled to use his eyes too much, they get tired—he goes to sleep over his book and blames his dinner; or he gets an eyeache or a headache. There is a long list of aches and pains that follow the forcing of tired eyes.

To this universal physiological inability of the aging eyes to focus, we give the name presbyopia, or "old sight." Ordinarily it begins some time in the early forties, but if one is farsighted or astigmatic, it comes earlier. If one is nearsighted, it may not come at all. The eyes of the farmer, or the sailor, or laborer, with little near work to do, may function efficiently long after forty; while ill health or overwork brings it on much earlier.

But sooner or later most of us have to wear convex glasses which "magnify" the print and bring it "nearer" and, in doing so, make near vision sharp, without fatigue. If one is farsighted or astigmatic, the presbyopic correction must be added to that of the distance. There are many people, especially ladies, who are quite determined that so long as they show no other indication of advancing age they are certainly not going to admit it by wearing glasses.

Each year sees a new crop of lotions, drops, tonics, and reading lamps advertised as substitutes for glasses, which are sold to these people.

Of course, glasses are at best more or less of a nuisance and not to be used unless the benefits more than counterbalance the inconveniences. One should remember, whether he uses glasses or not, that the closer he holds his book the more he has to focus and strain, while the farther away, the more relaxed his eyes are and the longer he can read without getting tired. Reading glasses should, however, not be stronger than necessary, for one does not wish to become dependent on them too soon, and it is much better to leave part of the focussing for the eyes themselves. However, for people who have real work to do and who must wear glasses of some kind, it makes little difference whether the glasses are strong or weak as long as they are efficient.

Diseases Occurring in Aging Eyes

One of the great compensations for the onset of "old sight" is that it results or should result in a complete and careful examination of the eyes, perhaps the first the patient has ever had. There should be a lot more to it than the mere examination for glasses, for the list of diseases that commonly occur in aging eyes is a rather long one. Some of them are rare and some of them very common; some are trivial and self-limited, others are painful and tend to get worse. Some of them threaten sight alone, while a few threaten life itself. There is no argument that applies to the annual physical examination of the body which does not apply with equal force to the eyes. The only person who is competent to make this kind of an examination is the eye physician. He has been trained to know and treat diseases whether they involve the eyes alone or the body behind the eyes. His work overlaps on many other specialties. He must have a knowledge of eugenics, pediatrics, neurology, and general medicine. He must always have in mind syphilis, tuberculosis, the toxemias, and the focal infections, and even the various tumors. He must be skilled in a highly specialized form of surgery.

As we get older the conjunctiva is not quite so smooth and white as it used to be, but gets thicker, and redder, and rougher. There is sometimes a scant irritating secretion which makes the eyes feel

full of sand. The lids get red and scaly and often chap and crack at the outer angle. Conjunctivitis tends to come back with every head cold. The lid reactions are slower, and the eyelashes fewer and shorter. Consequently elderly persons often get foreign bodies in their eyes. The eyes water and run sometimes because the irritation is enough to cause a profuse flow of tears, and perhaps because the tear ducts are stopped up. These are minor ills, but they are very annoying. Sometimes they can be controlled by domestic treatment, like hot compresses or boric acid solutions, but in many cases a physician must be consulted.

The fact that one can see perfectly is no proof that his eyes are healthy, neither is bad sight a necessary sign of disease; but if the vision cannot be made normal with glasses, one should find out the reason why.

Cataract

When the sight begins to fail the thing that the average adult dreads more than anything is cataract. He has seen it among his elders, and fears the impairment of vision and perhaps an unsuccessful operation at the end. Many people are as depressed about cataracts as they would be about cancer. And yet in many cases it is not such a terrible thing. It is not necessarily conspicuous and, unless complicated in some way, it is never painful. It occurs in many forms, some due to disease like diabetes or to accident; but for the most part it is the result of perfectly natural senile opacities in the crystalline lens. One of the first things to arouse the physician's suspicion is that, in the beginning, the lens, while still perfectly transparent, swells and makes the patient nearsighted. He often finds that he can again read without glasses, and is very proud of his so-called "second sight."

If the opacities begin in the center of the lens, directly behind the pupil, they blur the vision from the very beginning, but in the majority of cases they begin in the periphery and need cause no great disturbance of vision for years and years. A careful study of a very large number of case histories showed that on the average a period of 15 years elapsed from the time the cataract was first discovered till it became "ripe" enough for operation. And when operation becomes necessary, the results, in spite of occasional mis-

haps, are almost uniformly good. The few bad ones are conspicuously evident while the good ones are not paraded or seen. With glasses, both far and near vision is often as good as it ever was in youth.

Since cataracts are often stationary for long years and occasionally clear up spontaneously, almost every eye physician has experimented in ways of imitating and outdoing nature, and numerous drugs and treatments have been advocated all over the world. Many of them are obvious frauds, some of them are actually dangerous, while others are good examples of wishful thinking. Almost every physician who has happened on a series of slowly progressing cataracts has thought he has discovered the secret only to have his hopes dashed as the cases average up. It is quite impossible to tell what has been accomplished in a condition which progresses so slowly and so irregularly. But there are many things that the physician can do in individual cases to prolong useful vision, and he is the one to decide when the cataract is ready for operation, and what are the chances of success.

Glaucoma

Perhaps the most serious of eye diseases which threaten people as they grow older is glaucoma. While it is not nearly so common as cataract, it is much more difficult to recognize in its beginning, and it often results in complete blindness in spite of the most careful treatment.

The eyeball is essentially a tough sac which would collapse if it were not filled and kept round by a fluid which is abstracted from the blood. This transparent fluid not only makes sight possible but carries nourishment to parts of the eye which have no circulation of their own, and then flows off through a physiological filter or valve. This automatically regulates the hardness or tension of the eye. There are some diseases in which the eye becomes too soft, but in all the forms of glaucoma it becomes too hard, sometimes stony hard, and the continued hydraulic pressure gradually destroys the delicate fibers of the retina and optic nerve and causes blindness. Sometimes there is an overwhelming swelling of the contents of the globe not unlike a hive in the skin. This causes a sudden and extreme rise in tension or hardness which we call acute

glaucoma. Unless this is promptly controlled, the sight may be ruined in a few hours' time. Sometimes the same is caused by inflammatory changes that fill the aqueous with exudates and deposits which plaster up the filter so that it ceases to function. But the relieving fact about all the acute glaucoma is that the patient knows at once that something serious is happening. He has a violent pain, sees rainbows about lights, and with it a terrifying reduction of vision, so that he consults an eye physician at once and in most cases the condition can be controlled before serious damage has been done.

The great destroyer of sight, however, is chronic simple glaucoma, which comes on so slowly and insidiously that it is not noted. The tension of the eye need not be very high or even constant. The patient gradually loses his capacity to see well out of the corners of his eyes, but often he hardly notices this as long as his central vision is sharp. There is no pain, often no rainbows, and for a long time no great diminution of vision. The process may run over months or even years, and the patient often discovers by accident that he has practically lost the sight of an eye. When he gets to the physician at this stage the diagnosis is perfectly simple. The pupil is large and sluggish, the eye feels harder than normal to the touch, the side vision has been impaired, perhaps the central as well, and the changes in the retina and optic nerve are conclusive. Unfortunately the damage which has been done is permanent. If the tension can be reduced within normal limits by treatment or operation, one can check the progress of the disease, but the sight that has been lost is lost forever.

In its very beginning glaucoma can be quite easily overlooked even by the physician himself, especially in patients whom he sees only at very long intervals. The pupils may be a little large, but the vision and the fields and the blind spots, on which we depend so much, have not yet been changed. The tension itself may be above normal only at night, and the optic nerve still seems normal. Only a careful and highly technical examination can detect the disease at this stage, and it is undoubtedly very often overlooked. When the diagnosis has been established, the patient must be under the frequent observation of his physician. He has delicate instruments for measuring the hardness of the eye. He keeps careful

records of the central vision, and the fields of vision, and can tell with certainty whether the disease is stationary or progressive. On his judgment the patient must depend for the decision as to whether treatment is sufficient or operation necessary. There must be no let up in the treatment, for any ground that is lost in the interval is lost forever. Many patients can be kept within normal limits year after year by the careful and unremitting use of drops which keep the pupil contracted to pinhead size. Conversely, anything that tends to dilate the pupil is dangerous, whether it be drops or emotions or even sleep. If operation was always successful, it would be infinitely preferable to have it over with rather than endure the drudgery of watchful waiting and constant worry, but the results of a perfect operation are not by any means always permanent and do not always obviate the use of drops or the frequent observation of the eyes.

Other Diseases

As people get older they tend to develop what might almost be called physiological changes in their blood vessels. The walls of the arteries particularly tend to become thicker and less elastic, until finally they degenerate into rigid and contracted tubes. In popular parlance, they have become "hardened." It requires much more pressure to keep up circulation through these contracted tubes and several unfortunate results follow. There is less fresh blood pumped into the tissues, and less old blood taken away, and the tissues have relatively short rations of oxygen and food. This results in impaired function and gradual degeneration. The efforts of the heart to keep up the circulation result in its enlargement, while the blood pressure in the inelastic arteries keeps getting higher and higher. Sooner or later the heart reaches its limit and dilates, or the arteries can no longer stand the pressure and leak or burst like bits of old hose.

Chronic kidney disease is an especially important factor in this cycle. The eye is practically the only place in the whole body where these vascular changes can be seen and studied. We see hemorrhages on the white of the eye which are not particularly important except as warnings, for they are absorbed without leaving a trace. But in the retina we can follow the whole picture

from the first narrowing of the arteries until they get to look like silver wires. We can see the area of poisoned or degenerated retina which, with the great disturbances of vision and hemorrhages of all sorts, from the merest little leak to one that fills the whole eye with blood, presents a complete picture. The retina is really a part of the brain and the changes that occur in one are likely to be duplicated in the other, from the tiny cerebral hemorrhage that causes the paralysis of a single eye muscle, to the large strokes that paralyze or kill. A careful routine examination of the eyes by one who knows how often reveals unsuspected conditions, like Bright's disease, diabetes, brain tumor, or locomotor ataxia, while there is still time to do something about them—before sight has been irretrievably damaged or the possibility of recovery gone forever.

I have written of only a few of the conditions that may affect the eyes of aging people. Some conditions are dangerous and require immediate treatment. There are others in which watchful waiting is about all that we can do, and in which there is much to be gained by keeping the patient in ignorance as long as possible. There are others in which the fullest revelation is the wisest and kindest thing. In the final analysis, the physician who has been given an opportunity of seeing his patient at required intervals is best able to judge the course to follow in each instance.

A Consideration of Student Eye Health from the Ophthalmologist's Point of View*

William L. Benedict, M.D.

AFTER presenting a brief survey of eye defects encountered throughout life, the author concentrates on the eye problems of the adolescent and youth of college age, and indicates that many of these problems may be solved by proper diet, satisfactory refraction, and correct illumination.

I UNDERSTAND that the problems of the Eye Health Committee of the Student Health Association have to do with conservation of vision of students and teachers and the improvement of conditions under which eye work is done. A consideration of these problems requires some knowledge of the anatomical development of the eye, of general physiology and particularly physiology of the eye, and of the function of seeing. To assume that the eye is an organ from which certain things may be expected under standardized conditions is to ignore the fundamental principle of inequality of natural stock from which individuals spring and of the environment in which their development has occurred. While we may set up standards of efficiency under which we may reasonably expect the majority of individuals to function in a similar manner and with similar endurance, we are all cognizant of the tremendous capability of some individuals who have eyes that organically are inferior but nevertheless do not break down under strenuous work. On the other hand, teachers and physicians are continually confronted with the necessity of making adjustments for persons in apparently perfect health and with organically normal eyes that for one reason or another are unable to maintain ordinary effort.

* Presented under the title, "Newer Knowledge of Eye Health," at the program of the Committee on Eye Health during the Eighteenth Annual Meeting of the American Student Health Association, December 31, 1937.

Only certain phases of these problems can be discussed in the short time available at this meeting, but I should like to take this opportunity to point out what appears to me, as an ophthalmologist, to be the most important items to which this Committee may direct its attention.

Stages in the Development of the Eye

Ontogenetically, the eye is one of the first parts of the human embryo to show differentiation. Strangely enough, the final development of the eye is not completed until the individual is approximately twenty-five years of age. During the process of development, many changes may be brought about in the eye through deviation, arrest, aberration, constriction, toxemia and disease. The tendency toward hereditary ocular defects is familiar to all students of genetics, but I think we sometimes fail to realize that many of the abnormalities that appear in early and middle life are due to influences which have their beginning in the earliest stages of embryonic development, and, either through negative or positive means of action, have an almost predictable effect upon the function of an eye of an individual with normal life expectancy. The more severe physical abnormalities result in such conditions as anophthalmos, microphthalmos, coloboma, optic atrophy, cataract, and corneal leukoma, all conditions with which ophthalmologists are familiar and conditions which are known to teachers of the blind. The less severe abnormalities, however, may result in only partial loss of function and, while constituting a distinct handicap, do not make it impossible for one to use the eyes a great deal.

We may divide into five stages the growth and development of the eye, in order to bring out more clearly the relationship between organic growth and function and, in a measure, to justify the reasons for setting up means of avoiding damage to the eyes through usage or conditions which would render use of the eyes ineffectual. The five stages of development may be indicated as: prenatal, infancy, youth or adolescence, maturity, and senility.

Prenatal Stage

In the prenatal period occur those changes that are likely to result in maldevelopment of the eye, producing what we usually

term as hereditary abnormalities. It should be borne in mind, however, that the date of birth is only an incident in the development of the human being and that what occurs shortly before birth, or shortly after, to interfere with the proper development of the eye may, with equal propriety, be termed congenital accidents. During the entire prenatal period the development of the eyes may be influenced not only by substances which affect the mother but also causes which arise directly within the fetus. For example, all of the endocrine organs of the mother are brought into increased activity during the life of the fetus. As the endocrine organs of the fetus develop and begin to assume their own function, a balance must be set up between the functions of the endocrine organs of the mother as against those of the fetus. Abnormal activity of these glands on the part of the fetus may result in abnormal development of the eyes.

Under certain conditions the development of the fetus may be materially changed by extraneous forces. The result of the external forces is easily demonstrated in experimental animals of rapid development through the introduction of toxic substances, such as alcohol, mercury or iodine, or by irradiation, particularly by *x*-rays, or by feeding diets that are deficient in some of the necessary vitamins. Many of the changes resulting from these sources are apparent at birth, but other changes may not appear until several years later.

Development During Infancy

During infancy the function of the eye develops. The macula is not formed until the infant is about three months of age. Ocular movements depend upon fixation and, until the macula is developed, the eyes of an infant may not be directed toward an object at will, and it is quite probable that the vision is not acute. During the first three months of life it is not uncommon to find children's eyes divergent or crossed, not because of any organic defect of the eyes but because of immaturity. It is doubtful whether the further development of the eyes can be materially influenced during this period except by means which would produce tissue trauma. In later months, however, up to the period of three to four years, the function of the eye becomes more highly specialized. It would

seem prudent to permit seeing to develop in a natural manner rather than to encourage close application of the eyes through the use of small toys, perusal of pictures, and other means of close visual application. During these first two periods, the prenatal and the period of infancy, the eyes are particularly subject to damage from disease. Acute diseases of the mother, such as measles, chicken-pox, scarlet fever, or infections, such as septicemia, venereal diseases and tuberculosis, may be active in the prenatal period and subject the eye of the embryo to slight or severe damage. Disorders and defects of the eye that result from diseases of the mother usually are discernible shortly after birth. The same diseases affecting the child may produce exactly similar damage to the eyes, so that in later years it is impossible to determine whether the damage occurred before or after birth, whether any discernible lesion should be considered congenital or acquired; and, as a matter of fact, it makes no difference.

There are a few disorders and diseases of the eyes that are considered to be hereditary, that is to say, they appear in several members of one family, not only in siblings but in succeeding generations. However, not all ocular defects resulting from these diseases are congenital. For example, such a disease is retinitis pigmentosa, a chronic progressive degeneration of the choroid and retina that makes its first appearance some years after birth and is not amenable to treatment. Many persons affected by retinitis pigmentosa have adequate vision until they are well along in college life. The disease may not be discernible by any test or examination in the earlier years but cannot escape detection after its progress has become established. Another example of hereditary disease is known as Leber's disease, which consists of degeneration of the retina and optic nerve sometimes associated with mental degeneration and which becomes apparent usually during the school age. Ocular defects and early degeneration are associated with diseases of the endocrine glands that have hereditary influence, such as the Lawrence-Moon-Beadle syndrome. There is also some question as to whether or not we should include in this category glaucoma and myopia. There are certain characteristics of glaucoma that would warrant such consideration. For example, severe glaucoma in the fetus may result in prenatal buphthalmos. Juvenile glaucoma also

often results in marked enlargement of the eyeball through increased intra-ocular tension. Influences which act upon the eyeball to increase its size without otherwise interfering with normal development will, of course, result in myopia. Eighty per cent of the children born with apparently normal eyes are hyperopic at birth. Some of these become myopic afterward. The tendency to myopia is undoubtedly more marked in some families than in others, and while it may be regarded as a recessive trait, it may also be considered as an hereditary characteristic. How much change in the development of myopia can be brought about by external influences is a question on which there is considerable divergence of opinion. Whether the course of myopia can be arrested or materially influenced by use of the eyes or by protection of the eyes is not definitely determined.

During the stage of maturity and senility the visual function, for one reason or another, may be expected to decline. In this Committee we are not particularly concerned with the use of the eyes beyond the college age, but if external forces, use or abuse of the eyes in any way determines the function of the eye in the later periods of life, then certainly such influences should be considered.

Eye Disorders During Adolescence

Ocular disorders during the later school years may be attributed to one or more of four particular influences.

First, let us consider the effect of systemic disease. During adolescence children are susceptible to constitutional diseases, particularly tuberculosis, rheumatism and pluriglandular disease. The age at which symptoms of such diseases develop shows considerable variation. The child that has matured at the age of fifteen may not show significant symptoms or pluriglandular disease until the age of eighteen or twenty. Juvenile tuberculosis may not become sufficiently established to attract attention until in the later teens. Evidences of hereditary lues, particularly interstitial keratitis, retinitis pigmentosa, optic atrophy, will quite likely appear in the later teen age.

The second most important cause of acquired ocular disorders is focal infection. Among the more significant may be mentioned tonsillitis, dental infection, and chronic disease of the middle ear.

The director of public health in one of the large universities informed me that he thought one of their most important activities yet to be developed had to do with adequate care of the teeth. The incidence of ocular inflammation from periapical dental infection is well recognized and it is quite evident that dental infection in youth is much more likely to produce an ocular inflammation than an equally severe dental infection occurring in the later years of life. Transient focal infections do not, as a rule, permit an individual to establish immunity, and repeated infections must be looked upon as repeated insults to the system, and in any single episode of dental infection an eye complication may arise.

Another, but more remote cause of ocular disorders among people of college age comes about through the use of alcohol and tobacco. Excessive use of either of these substances is reflected in reduction in vision and conjunctival congestion. These substances may act directly on the eyes or indirectly by dulling the sensibilities to such an extent that the eyes will not function properly. The effects on stability of vision, disturbances of ocular motility, and interference with accommodation may be seen as transient effects from small amounts of alcohol and tobacco. While normal eyes may well survive repeated insults from these toxic sources, eyes that have previously been injured by disease or are inferior may suffer permanent deleterious effects from comparatively small amounts of such poisons as these. The indirect effect of the excessive use of alcohol and tobacco comes about through malnutrition. Alcohol or tobacco cannot be considered as a substitute for food. Small amounts may stimulate the appetite, but excessive amounts, particularly of tobacco, will probably reduce the appetite.

Vitamin Deficiency

Experiments on animals during the past few years have established beyond any doubt the need of adequate vitamins in a diet of the mother during the early stage of development of the fetus. Anophthalmos, microphthalmos, and various grades of arrested development of the eyes of pig embryos may be brought about by a diet deficient in vitamins. There is much evidence to indicate that some of the supposedly congenital abnormalities or hereditary influences in the human have been brought about through insufficient nutri-

tion on the part of the mother. The effects of malnutrition in the adult may not at once be apparent and may only be elicited by special experiments quickly. As a rule, recovery follows inclusion of an adequate amount of vitamins in the diet. There are conditions under which college students live that, to my mind, are extremely important to this Committee on Eye Health. In some of our large universities a few students are living in small rooms, inadequately heated and ventilated, take many of their meals at drug store or lunch-wagon counters from food handlers who are not adequately supervised or inspected, and subsist on a diet that is inadequate in one or more of the necessary elements. More and more students are compelled to subsist on pick-up meals either because of inability to find adequate boarding houses or because of economic necessity. I am convinced that in the past twenty-five years the tendency has been toward inadequate rather than more adequate nourishment among a large proportion of the student population of our larger institutions. There is no question but that smoking is more prevalent, and the drinking of hard liquor is probably more prevalent among students than it was 25 years ago. Among college women the desire to remain thin, or, as the English people say, to practice slimming by light eating, may be a passing fad, but at the present time I think it constitutes one of our greatest health hazards and is one of the most marked influences in the production of headaches and other symptoms which may be referred to the eyes.

The remedy for eye symptoms that may develop through any one of these influences does not lie in the prescribing of glasses or improving the illumination or in any type of treatment applied directly to the eye. The conditions under which ocular disorders develop should be investigated and unfavorable conditions should be corrected. The closest co-operation between the oculist, the student health director and the school is required to bring about better conditions under which students work and live during their college years. Obviously, investigation of students' living conditions is as important as a thorough physical examination, and the circumstances under which the individual student works must be made a part of the medical record.

Refraction as a Therapeutic Measure

In schools that have an established student health program, provision has been set up for refraction of those students who have symptoms of eyestrain. It is obviously impossible to make a satisfactory and thorough refraction of all students in our larger universities, and in many smaller colleges ophthalmologists are not available. We know that it is possible for many students to carry minor refractive errors through years of close application of the eyes without symptoms. I think most ophthalmologists are agreed that such students do not need to wear glasses. This applies particularly to those who are hyperopic and have a small amount of hyperopic astigmatism. Students who are myopic, of course, need glasses in order to give them more distinct vision at a distance. It is also believed by many ophthalmologists that the progress of myopia may be retarded or arrested through the constant wearing of glasses which give adequate optic correction. In some institutions, surveys have shown that students who were myopic were not handicapped, but, as a rule, stood in the upper third of the scholastic zone. One explanation for this is that students who are myopic are not adapted for outdoor exercises, are somewhat reticent in participating in extra-curricular affairs because of the necessity for wearing glasses and consequently devote more time to their studies.

The coincidence of refractive errors and muscular anomalies of the eye has, in the past, been considered a concomitant affection which can be corrected by the use of glasses. The fallacy of this situation, however, will be apparent to all who reflect upon the ontogenetic development of the eye and adnexa. The functioning part of the eye has developed from neuro-ectoderm, while muscles and other appendages of the eye develop from the mesoderm. Each has its own directing factor, and a disorder of ocular motility may arise without organic defect of the eyeball, or an organic defect of the eye may exist without disturbance of ocular motility. The association of seeing and ocular movements is in itself a co-ordinated function which is only partly influenced by the use of corrective glasses. Non-medical examiners of the eye who attempt to detect and correct ocular defects are likely to fall into error through

ignorance of this association and the factors which influence it. Examinations by incompetent persons with the consequent prescription of corrections which are only partly effective, without an understanding of the complete picture set up by the syndrome of eyestrain, constitute one of the great health hazards in the commercialization of glasses. Tests that are made by means of instruments that detect anomalies of certain functions are useful aids but may be misinterpreted and undue significance attached to certain types of results. Unfortunately, not all medically trained men are sufficiently skilled or experienced in disorders or diseases of the eye to give balanced consideration to the results of these tests, and an apparent division of opinion among medical men leaves an opening for commercial propaganda.

Illumination

There is only one other line of endeavor of which I wish to speak and which may be seriously considered by this Committee. That has to do with illumination. We do not have definite information as to what permanent effects may follow the use of the eyes under improper lighting conditions, but we do know that glare induces nervousness, irritability and fatigue and we believe that the same symptoms may be brought about by work under inadequate illumination. The eyes are much more adaptable to insufficient illumination than to glare, and for short periods of time eyes may be used under conditions that vary a great deal from the normal. The conditions under which students work in their rooms and in libraries, in laboratories and in shops, could well be the subject of an intensive survey. Recent issues of pictorial magazines reveal students working in small rooms lighted only by exposed electric lamps hanging suspended from the ceilings on long cords, or by desk lamps from which glaring light is reflected from the paper to the eyes. Usually the poorest lighting is to be found in the students' libraries and in laboratories where they must work at painstaking reading, drawing or dissecting for many hours a day.

The symptoms of eyestrain of students come from a number of sources. They certainly do not all come from errors of refraction. Examination confined to the eyes certainly will not reveal in all cases the fundamental basis of their complaints. I think, therefore,

that it becomes an important part of the student health division to inquire into the conditions under which the students live and work. An ophthalmologist should obtain and consider information concerning an environment necessary for an adequate evaluation in any particular case. The student health records, in addition to the data obtained on physical examination, should contain information on the students' diet, habits and living quarters. All students who have symptoms or complaints referable to the eyes should be examined in the light of this complete information.

The Fifteenth International Ophthalmological Congress

Park Lewis, M.D., F.A.C.S.

AS a prominent participant in the Congress, Dr. Lewis gives a vivid account of its accomplishments, skilfully re-creating the atmosphere of the Egyptian setting.

THE Fifteenth International Ophthalmological Congress, held in Cairo, Egypt, December 8–15, 1937, was one of special interest to the readers of THE SIGHT-SAVING REVIEW. On the invitation of the Egyptian Government, the following had been appointed by the Secretary of State, with the approval of the President, to represent the United States at the Congress: Dr. Harry S. Gradle, director of staff, Illinois Eye and Ear Infirmary, Chicago, Ill., chairman of the delegation; Dr. E. V. L. Brown, professor of ophthalmology, University of Chicago, Chicago, Ill.; Dr. Frank E. Burch, professor of ophthalmology, and Dr. Henry P. Wagener, associate professor of ophthalmology, University of Minnesota, Minneapolis, Minn.; and the writer.

As at the Fourteenth Congress, held in Madrid four years before, the prevention of blindness formed an essential part of the official program. Its importance continued to be recognized in this later international meeting. The gathering was one of great brilliancy. The initial meeting was opened by the young King Farouk in the hall of the ancient Egyptian University. In this splendid building was gathered a large, representative audience, including delegates to the Congress, Egyptian physicians, and others interested in the proceedings. On the left side of the stage were the representatives of the government, picturesque in their red fezzes, while on the

right, filling the stage for several rows, were delegates from the countries represented.

Opening of the Congress

At precisely 10 A.M., the King and his suite entered the royal box. He was acclaimed with the audience standing. With His Majesty were the various princes, Mohamed Aly Ibrahim, Mohamed Ali Halim, Ismail Daoud, the Nabils Soliman Daoud, Mansour Daoud and Abbas Halim, Mustapha el Nahas Pasha, the Prime Minister (who has since been deposed), Said Zulficar, and Ahmed Hassanein Pasha with his aides-de-camp. To the left of the royal box were the cabinet ministers and ecclesiastical dignitaries, while in the boxes immediately facing the King were the British ambassador and other members of the diplomatic corps, together with many prominent Egyptians. On the platform were: Abdel Fattah el Tawil, Minister of Public Health and president of the local organizing committee; Dr. Eisa Hamdy el Maziny Bey, technical chairman of the Congress; Professor J. W. Nordensen, of Stockholm, Sweden, president of the International Ophthalmological Council; and the delegates from the various countries represented. A touch of color was given to the dark morning clothes of the European delegates by the red academic robe worn by the rector of the University of Edinburgh, Mr. Sinclair, who spoke in place of Sir Duke Elder.

After the King had formally opened the Congress, the Minister of Public Health thanked King Farouk for his attendance and patronage, which were evidence of his interest in science and in savants. Speaking for the Government, he expressed himself as pleased and proud to welcome the delegates and hoped that their participation in discussions with the Egyptian ophthalmologists would lead to a solution of scientific problems and to a lessening of the ills of humanity. He considered that the selection of Cairo as the place of meeting for this year was a proof of appreciation, on the part of the Congress, of the work of Egyptian ophthalmologists and the Egyptian Government in their combat against trachoma and the eye diseases prevalent in their country.

Dr. Nordensen, in an eloquent address in French, thanked His Majesty for his attendance at and patronage of the Congress. He

spoke of Egypt as the cradle of science, and of the more recent work done by the successive Egyptian Governments, and under the present royal dynasty, to combat eye diseases. He thanked His Majesty for his interest and hoped their deliberations would have every success.

After saluting all those present, King Farouk left and the proceedings continued under the presidency of the Minister of Public Health.

The next speaker was Dr. Eisa Hamdy el Maziny Bey, Director of Ophthalmic Hospitals in Egypt and technical chairman of the Congress. Maziny Bey expressed his gratitude to the King for the support of the ophthalmic measures taken for the control of eye diseases in Egypt, and particularly of the advances made under the rule of his father, King Fuad the First. Indeed, it was through the inspiration of the former king that the invitation was extended to the Congress to meet in Egypt, and every measure was taken under the direction of the present King to add to the comfort and convenience of those who were in attendance. While it was not mentioned by Dr. Maziny Bey, the fact was that a very large appropriation had been made by the Government for the entertainment of the guests; special reductions were made in railroad fares; and free entrance to all the museums and other privileges were accorded. A reception which was given by the King later in the week was most elaborately planned.

American Representative's Address

The delegates from the various countries then responded to the address of welcome, each in turn. As vice-president of the International Association for Prevention of Blindness, and delegate representing the United States, the writer made the following response to the address of welcome by Fattah el Tawil, Minister of Public Health and president of the local organizing committee:

"Your Excellencies: I speak for the delegates appointed by the American Government to represent the United States at this the Fifteenth International Ophthalmological Congress. We thank you for the generous reception that you have accorded us and we bring to you greetings.

"We come also with a gift that we beg you to accept as from our

people to yours. It is a gift that we regard as the most precious thing that we possess and that we have to give. It is a gift of our friendship. Our native Indians say, 'A gift for a gift.' May we not bring back to America a like gift from your people and your Government to ours?

"We look upon this country as the fountainhead of the most ancient civilization. It is at the crossroad of the world. Egypt is the interpreter of the East to the West and of the West to the East. When Egypt speaks, all of the Orient listens; what Egypt says is heard to the farthest boundaries of the most western lands.

"We come to you with modesty and with some trepidation. You, who have taught the world so much, what lessons will you have for us who have come from the ends of the earth to get new knowledge? We of a newer and younger country have the feeling that the soldiers must have had when, pointing to the pyramids, Napoleon said, 'Forty centuries are looking down upon you.'

"It is singularly appropriate that this International Congress should be held in the Egyptian University, the most ancient in the world. It is fitting also that the initial session should be opened in this splendid hall, wh ch is an example of the latest modern architecture. It symbolizes the attitude of your nation today. You retain all that is great in the old, but your arms are open to all that is best in the new. Especially are we rejoiced to know that blindness is being steadily diminished in your land.

"May we learn at this Congress not only to save the world from the blindness of our physical eyes, but, from the touch of the hands and the deeper penetrating gaze into each other's hearts, learn the friendship and the good will, each for the other, that lie there. We offer you our most sincere congratulations on the scientific and sanitary advances that you have made under your late king and we look forward to the still greater achievements that may be expected under your new ruler, the young King Farouk. May we express the sincere wish that the reign of His Majesty may be a long and prosperous one, and that under his rule may continue to live a happy and a progressive people!"

Continuing, Dr. El Maziny Bey said that since the accession of His Majesty, the late King Fuad, to the throne, in 1917, a revival and advance in all departments of life had begun, especially in those leading to the prosperity of his subjects. One of these projects was the care for the sick, particularly those affected with eye diseases, which are so widely spread among the poor inhabitants of this land. As a proof of encouragement to science the late king had given

orders that one of the ophthalmic hospitals (that at Giza) be given His Majesty's name and another hospital (that at Rod el Farag) be given the name of his eldest daughter. Both of these he honored by attending their opening in person—the first in 1926 and the second in 1929. This epoch was marked by great ophthalmic progress throughout the country, the number of ophthalmia units increasing during his reign to 109. In 1936, through these measures, 1,133,599 new patients were examined in the Egyptian ophthalmic hospitals, 344,661 operations were performed, and the out-patient visits reached 7,741,226. This had a great effect in reducing the number of the blind in Egypt, for the percentage of blind among new patients in the ophthalmic hospitals dropped from 17.4 per cent in 1910, to 5.63 in 1936.

Under the progressive influence of King Farouk, a large appropriation has been made by the Egyptian Government to improve the condition of the peasantry. The people will be educated to higher standards of living. Projects are already under way for the installation of clean drinking water and sanitary appliances in every home. This will prove to be an ultimate economy, making less necessary the continued building of additional hospitals.

On behalf of the oculists in Egypt, he welcomed the guests, who came from all over the world, to bestow on them the fruits of their experience and to see the extent of the endeavors in the fight against eye diseases in Egypt. He then welcomed by name the representatives of the different countries: Professor Lohlein, representative of Germany; Professor Marquez, who was the president of the Fourteenth International Ophthalmological Congress, held in Madrid; Mr. Sinclair of Edinburgh and the writer speaking for the English-speaking nations; Professor Bardelli of Florence, for Italy; Professor Koyanagi, for Japan; and Professor Szymansky, the former president of the Polish Senate, who spoke for the other nations.

The reception given by the King on the evening of December 10 was most elaborate and beautiful. A long stairway led to the palace corridor, on each side of which were guards in the Egyptian uniform standing at attention. These guards were stationed through the immense hallway leading to the reception room. The official delegates from the various countries were then shown into another

hall, where they awaited a reception by the King. They were presented in groups by the representatives of the various embassies, and then all repaired to the theater, at which was given a play in Arabic, followed by an opera with noted singers. The King remained during the entire performance, and afterward joined the guests in the refreshment room, where supper was served.

Prevention of Blindness Measures

On Saturday, December 11, the entire morning was given to the discussion of the prevention of blindness. The session was opened with a report of Dr. Bailliart, of France, president of the International Association for the Prevention of Blindness. The first part, presided over by the writer, was a consideration of the prevention of blindness in tropical countries, and the speaker was Dr. A. F. MacCallan, president of the International League for the Control of Trachoma. Those who followed were Dr. Sadek of Egypt, Professor Toulant of France, Professor Weve of the Netherlands, and a number of others. The second portion was the prevention of blindness from a social viewpoint. The report was opened by me as vice-president of the association, and the speakers included Dr. Bailliart, Professor Marquez, Dr. Maziny Bey, and Mr. Lewis H. Carris, managing director of the National Society, who gave a report prepared jointly with Mrs. Eleanor B. Merrill, associate director. This report, it may be said, was of exceptional value and was accorded much appreciation. Another valuable and interesting presentation at this session was a report on the prevention of blindness by Dr. Sushii Kukherjee from Calcutta, India, illustrated by an excellent motion picture film which is used for the popular education of the natives.

The discussion of the reports was of such general interest that while Dr. Alvaro from San Paulo, Brazil; Dr. Barriere from Uruguay; Dr. Cassimatis from Egypt; and doctors from Poland, India, Great Britain and other nations, were able to speak, the hour for closing the session had arrived before a number of others could be given the opportunity to be heard.

Various excursions were provided for the ladies during the sessions of the Congress, these being so arranged that time was left for visits to the mosques, the bazaars, the Coptic churches, the

monuments, and other points of great interest which are found everywhere throughout Egypt.

The Thirteenth International Ophthalmological Congress at Amsterdam was the first in which there had been official recognition of preventive measures as an essential part of the work of the ophthalmologist and one of his responsibilities. At the close of that Congress, Professor van der Hoeve invited those present who were interested to remain after the Congress. It was then proposed that two groups should be formed, one for the control of trachoma, which is the most serious menace to the eyes of those living on the littoral of the Mediterranean and throughout the Near and Far East, and one for the prevention of blindness: the first organization, under the presidency of Professor de Grosz of Budapest, whose experiences in trachoma had been extensive, and the second under that of the late Dr. de Lapersonne, for so many years the dean of ophthalmology and professor of ophthalmology at the Hôtel Dieu. At the meeting in Madrid official recognition was taken of preventive measures in placing these studies prominently as a part of the work of that Congress. Dr. MacCallan, who for 20 years had been the head of the ophthalmic hospitals in Egypt, replaced Professor de Grosz, and Professor Bailliart took the place vacated by the death of Dr. de Lapersonne.

It was specially important that there should be a recognition of living conditions in an area such as Egypt, over which such an extensive amount of eye disease prevailed. Dr. Maggiore has shown in the past that environment has much to do with the propagation of such an infection as trachoma. Some time ago he told of the seaport of Bari, with a population of 150,000. It has an old and a new part, the old town being largely given over to a maritime population, living in crowded and unclean habitations, and the new city being under modern sanitary regulations. Although the children in both sections are submitted to the same general treatment, the amount of trachoma in the crowded and unclean section is twice the amount that it is in the newer and more sanitary part.

Excursion to an Egyptian Village

With the thought of learning something of the living conditions of the native Egyptian villagers, a little visit was undertaken to

the village of Bahtim, which to the writer was perhaps the most interesting of the excursions taken. Bahtim is located 15 or 20 miles from the Giza Laboratory, in which much valuable work has been done under the direction of Dr. Wilson. In company with and through the courtesy of Dr. and Mrs. Wilson a special visit was made to this village. The other guests included Mr. Sinclair of Edinburgh, Dr. Phillips Thygeson, who is so well known for his work on trachoma, both in this country and in Egypt and Tunis, and Dr. Polk Richards of the United States Public Health Service, who for many years has been in charge of the eyes of the Indians.

Egypt is a land of villages. Aside from two great cities, Alexandria and Cairo, there are few large centers of population. One village is, therefore, typical of all, and the Egyptian fellah, the agricultural laborer, is living under much the same conditions as those under which his ancestors lived for 3,000 years. The houses are made of dried mud, usually one story high, and covered with matting, corn-stalk fibers, or straw. These are packed together along narrow streets, parts of the house being open to the sky, there being practically no rain in upper Egypt. The sleeping rooms for the major part are without windows, the only air and light being that which enters by the door. In one such room a low doorway led into a small room, perhaps 10 by 8 feet and about 6 or 8 feet high, on the farther side of which was the native clay stove. On this stove five persons slept at night; the nights in Egypt are often quite cold. A little court, perhaps 5 feet wide, led into this house. Access to the roof was obtained by a log or tree trunk sloping up at an angle of about 45 degrees. As we entered, a man was walking down this incline in his bare feet; following him was a cock, whose way was being contested by a goat which was on its way to the roof. The cock eventually gave way and the sure-footed goat went to the top. He was then immediately followed by another goat. The ready access of animals to this matted roof would account for a condition that would be unbearable were it not for the dry atmosphere which causes the ordure to be partially evaporated. Leaving this courtway, we encountered a boy delivering milk. A look into the jar in which it was carried made evident that it was unclean.

A school in the center of the village was of stone with a stone floor. It seemed chilly and damp, coming in from the fresh open

air of a December morning. The room was filled with bright-eyed intelligent children. Arabic lessons were written on the blackboard. The children immediately responded when we held up our fingers for them to count. They answered in Arabic and, we were told, correctly.

We then went to the clinic room, in which were seated about 20 women holding their children, ranging from one to five years of age, on their laps. The children were brought daily for treatment of their eyes. The mothers and babies become tired of the routine, so they are kept coming regularly by being given a little bribe. After his treatment, every child receives in each hand a millieme, in value about half a cent, which, the doctor observed, would buy him his breakfast. We were informed that the ophthalmias, the inflammations that come from ordinary infection, were controlled by these daily treatments, but that trachoma was not affected, that it went on and on and would continue for a course of years. Trachoma is now generally recognized as an infectious disease caused by a filtrable virus. It is not, therefore, a matter of surprise that, as Dr. Wilson told us, 100 per cent of the children have trachoma. One would rather expect, if it were possible, that there would be more.

As we left to go to our cars we were unable adequately to clean the ordure from our boots. We each of us, therefore, had a native scrape the boots with his knife until they were in decent condition. It occurred to us that if there could be put in these villages, or in some one of them, as an object lesson, a model school, supplied with plenty of good clean water, which could be secured by drilling about 8 feet, it would then be possible so to use the moneys for the control of eye diseases as to give more effective results.

Under these conditions we may easily understand the rather hopeless conclusion reached by Dr. Wilson, who says in a report of 1935:

"I cannot say that children are more susceptible to the acute ophthalmias than adults, but they are certainly more likely to become infected. As regards the peasants of Egypt, who, as we have already noted, form the bulk of the population, I am safe in saying that few, if any, of the children reach the end of the first year of life without having had an attack of acute ophthalmia, and certainly none reaches the end of the second year.

"Children are sometimes affected even from the first month of life, and at the age of three months not a single normal conjunctiva is found. This lamentable state of affairs is doubtless due to the ignorance, the apathy, and the superstition of the people, and to the almost complete absence of sanitary conveniences. Hence the magnitude of the problem of prevention. In Bahtim 100 per cent of these babies had trachoma."

The weather during the Congress was excellent. Every convenience was afforded for facilitating travel, and altogether the Congress was noteworthy in extending throughout the world work for the conservation of sight and the prevention of blindness.

This report must not be closed without a word of appreciation for the unremitting courtesies extended by the representatives of our Embassy and Consulate in Cairo. In response to the direction of the Government at Washington, they rendered every assistance possible, and their personal aid outside of their official requirements is a delightful remembrance of our visit.

Conserving the Eyes of Youth*

Charles A. Perera, M.D.

AN elementary discussion of the care of the eyes during the prenatal stage, infancy, and childhood, with a consideration of such defects as cross-eyes, and a warning against dangerous toys.

WE are likely to underestimate the value of one of our most precious possessions, our eyesight, unless some unfortunate experience teaches us a lesson. Unknowingly we expose our eyes and the eyes of our children to dangers which are avoidable. Much unnecessary suffering and loss of vision can be prevented by an understanding of some of the principles concerned with the care of our children's eyes. Through the efforts of the medical sciences and such organizations as the National Society for the Prevention of Blindness, countless eyes which would have become blind only a few years ago are now saved. Diseases are being wiped out, and hazards are being eliminated from schools and industries. Still more can and must be done to prevent the needless loss of sight which is still taking place. Only through the closer co-operation of you, my radio listeners, with your medical friends and advisers can the sacrifice of the eyes of youth be ended.

It is important to realize that the eyes are a part of the whole body and may be affected by diseases which originate outside of the eyes themselves. Dimness or loss of vision is a symptom of many bodily disturbances and should always be investigated by a physician. Many persons complaining of failure of sight need glasses, but a careful examination by an eye physician may disclose the presence of some serious sickness of the eyes, brain, kidneys, blood, or some other illness requiring medical supervision. Only too often do we expose our organs of sight to needless hazards when

* Radio talk under title of "Conservation of Vision," given over WOR and Mutual Broadcasting System network on Friday, January 14, 1938.

we allow them to be examined and treated by persons who have no medical training in the care of eyes.

Prenatal Care an Eye Health Measure

The care of our children's eyes must begin before the time of birth. Every pregnant woman should see her physician and have a thorough medical examination long before her child is to come into the world. The ravages of syphilis can be reduced and many blind eyes saved from darkness if we only make use of the knowledge which scientists have painstakingly gathered together. Our great nation is still behind many others in eliminating this disease. Compulsory blood tests before marriage and at the commencement of each pregnancy would reveal the presence of this curable illness. Adequate treatment, begun immediately, would virtually eradicate congenital syphilis and its involvement of the eyes of children. Great strides have been made in this direction by public health authorities, medical organizations, and lay groups, but much remains to be done. You can help by discussing the problem with your doctor and friends. As soon as the public understands the factors concerned, and co-operates more fully, our goal will be in sight.

Eye Care in Infancy and Childhood

The severe inflammation of the eyes of newborn infants, known as "babies' sore eyes," is due to infection by germs getting into their eyes at birth. Many of the blind adults of today owe the loss of their sight to this disease, which is curable if treated in time. Treatment of this infection in the expectant mother, and the use of prophylactic drops in the baby's eyes immediately after birth, have done much to reduce this cause of blindness. Ignorance and neglect must be fought to wipe it out. Mothers should realize that babies with swollen, discharging eyes should be taken to the physician at once. They should know that the discharge from the infant's eyes is highly contagious, and that an adult's eye infected with these germs is in grave danger. The infection may be spread through towels, handkerchiefs, basins, and clothing. Prevention of this disease is vastly more effective than efforts at cure, once the child's eyes are involved.

Red, inflamed eyes in children or adults may result from infection on the surface of the eyeball or from disease inside of the eye. A physician should be consulted as soon as possible. Much damage may be done by postponing treatment of a serious eye condition in the hope that it will pass away by the use of eyewashes.

The vision of every child should be tested before entering school. If the sight of one or both eyes is subnormal, the child should be brought to a physician. This applies also to a child who complains of symptoms of eyestrain, such as headaches, tired feeling in the eyes after near work or movies, and smarting and burning sensation in the eyes. The sooner treatment is begun, the better the chance of improvement. Glasses may be prescribed for constant use, or perhaps only for close work. Some people still believe that it is harmful to wear glasses and that wearing them will make their children need them always. This notion is altogether wrong. The physician trained in the treatment of eye troubles will order glasses for a child only to improve the eyes and to prevent harm which cannot be later repaired. In many cases glasses are prescribed for constant use by youngsters so that they will not be needed for all-day use when the child is older and wishes to go without them in the street, while at play, and at social functions.

In some eyes defective vision is due to a scar in the back of the eye. Glasses will not help these cases. This is also true of some normal-appearing eyes which have never developed the power of keen vision. Parents and teachers sometimes cannot understand a doctor's report that a child's defective sight cannot be improved by the wearing of glasses.

Eyestrain

An important factor in the production of eyestrain is poor lighting in homes and schools. The increasing use of artificial light and the necessity for doing near work with the eyes in the evenings make us realize that good lighting is necessary to prevent damage to the eyes. Lighting engineers and eye physicians have been working at this problem for years, and they have determined the amount of illumination required for different types of work.

Some parents are very ambitious for their children, and make them do so much extra work involving the close use of the eyes that

the youngsters do not have enough time to get out of doors and play. Curiously enough, this sort of thing often takes place in families with nearsighted children, who need more outside play and athletics and less inside reading and studying. Nearsighted boys and girls frequently prefer to bury their noses in books rather than to get out in the air; excessive near work with the eyes in such children should be avoided.

Poor reading habits may strain the eyes. Reading matter should not be held too close to the eyes, nor should the common habit of reading while lying down and leaning upon the elbows be permitted.

The many sight-saving classes are providing an opportunity for children with poor vision to obtain an education without straining their weak eyes. Many of the children who are to be found in these classes had their eyesight impaired by preventable diseases and accidents.

Cross-Eyes

Children's eyes which turn out or are crossed require immediate and careful examination by the eye physician. Neglect of this will reduce the possibility of obtaining a perfect cure. A few cases of turned eyes have paralyzed eye muscles; most of them are caused by overacting or underacting sets of eye muscles. After a thorough study of the movements of the eyes and a test of the child's vision with the use of drops, glasses will usually be prescribed. Eye exercises may be employed in addition, to improve the vision and to help make the eyes work together properly. In many cases these measures result in straightening the eyes; in the remaining cases, operation upon the eye muscles may be necessary. With modern surgical methods, there is no danger to the eye in these operations. We no longer wait to see whether the child will "grow out" of his crossed eyes; this happens only very occasionally. Physicians now advise operation when needed, preferably before the child enters school. For the imbalances which develop after the kindergarten age, surgical correction is indicated as soon as it has been demonstrated that medical measures alone are not sufficient.

This brings me to a subject that is not directly concerned with vision, but which is of great importance to our children—the influence of facial disfigurement, especially involving the eyes or lids.

Children are frankly outspoken and unknowingly cruel to their unfortunate playmates with an unsightly eye, or a lid droop, or a crossed eye. The mental damage thus inflicted upon some innocent little sufferer may change his personality and take away much of the happiness which is the right of every child. Excessive timidity and bashfulness, the desire to withdraw from the society of his fellows, and inability to meet the problems of life may result. Some of these children become problem children, often being pugnacious or self-assertive in their efforts to compensate for their deformity. In these days of keen competition for employment, appearances count for a great deal. The risks involved in the correction of most of these disfigurements have been so reduced by modern surgeons that we parents are doing our children a grave injustice if we do not take measures to make our youngsters feel that they look like other children.

Eye Accidents

Accidents in the home or during unsupervised play form a large proportion of needlessly lost eyes. A small speck or cinder in the eye is a frequent occurrence. This apparently trivial injury may lead to ulceration and scar-formation as a result of infection from misguided attempts to remove the foreign body by a corner of a dirty handkerchief, or by using a pointed toothpick or some such object. If the foreign body is not easily washed out by a gentle irrigation with a boric acid solution, or is not easily removed from beneath the lower lid by a wisp of cotton, the patient should be taken to a physician. This is especially important in the case of specks imbedded on the front of the eyeball.

Injuries to the eyes should be treated by covering with a sterile dressing applied without pressure, and immediate consultation with your doctor. Careless treatment of the injured eye before medical attention is obtained may cause further damage.

The best treatment for eye injuries is to prevent them from happening in the first place. The prevention of eye accidents is relatively simple if only parents would stop and think over the principles that are being used to protect the eyes of workmen in factories and machine-shops. Eliminate the hazards and the number of accidents will be reduced. Think twice before letting the small child

play with something that may injure his eye or the eye of a companion. Sharp-pointed scissors and pocket-knives should be allowed only when the youngster is old enough to understand how to use them. Children carrying pointed instruments should be taught to hold them point-down and far from the face. Devices which explode or hurl a projectile—such as darts, arrows, sling-shots, cap pistols, and air rifles—are frequent causes of eye accidents. A boy should not own a BB gun until he has mastered the caution and care necessary in handling a real rifle or shotgun. Several recent accidents in which an eye was destroyed by a BB pellet occurred among groups of boys deliberately shooting at each other while playing "cops and robbers" or some such game. Parents must not be blind to these dangers to their children's eyes.

Regularly, every year, we see the little victims of Fourth of July accidents, even in communities where it is illegal to sell fireworks. Some well-meaning but ignorant parents, usually the fathers, I admit, actually go out of their way to break the law and endanger the sight and health of their young sons and daughters. It seems impossible to teach some people the dangers in exploding fire-crackers or torpedoes until one of their children has lost one or both eyes, or is burned in some other part of the body. No variety of fireworks is harmless; even the supposedly safe "sparklers" can cause serious burns.

In my preceding remarks I have called attention to some of the ways by which a child's vision can be saved. Prevention of trouble is very much to be preferred to repair of the damage caused by neglect or ignorance. Think of your children and be reasonable.

Miss Linda Neville—Kentucky Sight-Saver*

Emma Bugbee

THE story of the personal efforts of an inspired woman, whose achievements in sight conservation are outstanding in her native state.

MISS Linda Neville—just "Miss Linda" to the home folks in Lexington, Ky.—had to choose recently between adopting Tiny David, a blind baby whom she had come to love, and continuing the state-wide work for the blind which she has been carrying on for more than thirty years.

Tiny David is an orphan and almost totally blind, but he has red curls and an ingratiating personality. Miss Neville had him in her home for many weeks, as she has had other afflicted children from time to time, but David was the only one she ever wanted to adopt. She realized, however, that if she continued lavishing so much time upon him she could no longer attend to the problems of other blind children, most of whom might be saved.

She told about taking him to the Arthur Sunshine Home and Nursery School for the Blind in Summit, N. J., where he will be reared.

"Tiny David already has been the means of saving other babies from blindness," she said. "I used to take him with me to hearings before the legislature and to public gatherings, where his charms stirred people's hearts as no amount of statistics would have done. I only hope that when he is an old man, preventable blindness will have disappeared from the country, and he will be able to rejoice that in his tiny way he had a share in that great work. Perhaps then he will forgive the generation that could not save him."

Tiny David's fate seemed doubly tragic to Miss Neville because

* Interview reprinted from the *New York Herald Tribune*, October 25, 1937.

"Miss Linda" and Tiny David

it is so rare even now for her to find a baby who cannot be aided by medical or surgical skill.

In the early days of her work she used to go out herself into the mountains and bring the babies to town, riding over the trails on muleback. Now, most of the arrangements are made by telephone. "Long distance, Miss Linda," announces her maid-of-all-work. That means the sheriff in a remote valley, perhaps, has learned of another infant whose eyesight is in peril and wants to bring it to Miss Neville.

Her house is always full of such forlorn guests—babies awaiting treatment in a hospital, babies recuperating from an operation, children whose young eyes are seeing for the first time the colors of patchwork quilts and the flowers on the bedside table.

Miss Neville runs what her friends call "a one-woman settlement house." She herself asserts smilingly that she never knows what she will find on her front doorstep. Once it was two babies in a corrugated paper box; once it was a tatter-clad child whose mother muttered, "This is Ninnie," and then bolted. Miss Neville welcomes them all, feeds them and pays part of their bills from a slender account called the "mountain fund" raised by charitable folks of Kentucky.

More than 700 have thus been rescued in the years since she started single handed to relieve the suffering from trachoma in the mountain regions of her native state. Now that particular scourge has been almost eradicated. Four hospitals under the United States Public Health Service have been established in the mountains. Other forms of blindness, however, are still prevalent, not only in the mountains, but in the cities and larger towns.

Miss Neville, still an individualist, makes every blind baby in Kentucky her personal charge, but now she has the authority of the state government behind her. Her tiny clients receive special rates in hospitals, free passes on the railroads and the state itself contributes $2,000 a year for their care. Any physician or surgeon meeting "Miss Linda" on the street, is likely to get an assignment to treat one of her guests, and none has ever been known to decline.

"The Angel of Kentucky" she was called by Dr. Arthur T. McCormack, of Louisville, president of the American Public Health

Association, at the final session of the recent convention of the organization here.

"Miss Linda" was induced to tell how all this began as she sat in the office of the National Society for the Prevention of Blindness, Inc., 50 West 50th Street, a few days after her trip to Summit.

She had been a young school teacher, still conscious of her Greek and Latin, she related, when she had once gone on a holiday up into the mountains to visit a friend who had organized a mission school. It was a beautiful day in early autumn, with trees clothing the mountainsides in scarlet and gold, she said, but on the school steps sat a young girl who could see none of that beauty. She was not the only one. Miss Neville had been twenty-four hours reaching the settlement by wagon and muleback, passing more than one cabin where a sightless person sat motionless on the squalid porch.

"What I saw that day hurt me," said Miss Neville. "I asked my friend what I could do to help, but I never thought then of a movement or society or legislation. I just couldn't stand it to think of those people going blind who could have been saved, they told me, had medical treatment been available for them."

A little later, she continued, back in her own home in Lexington, she heard of a man threatened with blindness, who lived far beyond the reach of any doctor. She begged her father to invite that man to come and stay in their home while he had hospital treatment. That was the beginning of her "one-woman settlement." Still later, she said, she made the acquaintance in New York City of the late Miss Louisa Lee Schuyler, philanthropist, who talked with her about forming a national organization to combat blindness.

"That was really the start of my work. But don't let's talk about me. I'm not important," said "Miss Linda."

What she likes to talk about is her guests—the blind boy who arrives barefooted and frightened by the noises of the strange city, clinging to the hand of father or mother, who somehow in their mountain home have heard that in Lexington is a lady who will help them. Once there was a boy who had walked twelve miles to reach her, frightened but determined. She kept him for weeks, and was rewarded when he left by hearing him say, "Now I aim to go a-fishin'."

"Miss Linda's" adventures with the legislature are another

chapter. She apparently is as persuasive with a committee as with a surgeon. For years she has appeared often at the state capital, seeing to it that her blind people are not neglected, that laws are enacted for their protection and relief.

"I never played politics though," she declared. "And I'd never tolerate it for any man to play politics with me. If anyone tried it"—she hesitated at the thought—"if anyone, any president or governor or senator or anybody at all did anything that wasn't for the good of my blind babies I'd—well, I just wouldn't stand it, that's all."

The Vision of the School Child*

Francia Baird Crocker, R.N.

EYE hygiene forms an important part of the school health program; a knowledge of the visual defects of children is of inestimable value to the teacher in understanding vision as a factor in class work and in behavior.

PROBABLY Pope, in his *Prologue to the Satires*, did not have teachers in mind when he wrote "explore the thought, explain the asking eye." But in counselling teachers it should be pointed out that if they would more fully understand a child's behavior, they should find out how much he sees—for vision exerts considerable influence upon how the child acts toward his parents, the teacher, and other children, and how he reacts to his surroundings. School physicians and nurses have frequent opportunities to point out that before rating a child's intelligence it would be advisable to determine if he sees accurately and quickly, so that he is not at a disadvantage in taking tests in which time and accuracy are factors in deciding the intelligence quotient.

One of the teacher members of the staff of the National Society for the Prevention of Blindness learned that the department of psychology in one of the state universities was giving paper and pencil tests to a group of children to establish their I.Q. ratings. Later the staff member had an opportunity to give 300 of the children in this group simple central visual acuity tests with a Snellen chart. Twenty-five of the 300 were found to have vision sufficiently defective to interfere with their ability to see critically and accurately the material used in the I.Q. tests. All 25 had been given low I.Q. ratings.

Poor vision may limit or interfere with school experiences in many other ways.

* Presented at the joint session of the Child Hygiene Section, Public Health Nurses, American Association of School Physicians, and the National Society for the Prevention of Blindness, October 8, 1937, Annual Meeting of the American Public Health Association.

The physician, teacher, and nurse, in striving for an intelligent understanding of the child, should fully comprehend and justly estimate for each child what are the normal changes in vision which may occur during the period of growth and development and what are the abnormal changes which may occur during this period.

It is evident that in order to plan ocular hygiene programs in the school it is necessary to understand the normal as well as the abnormal changes which occur. Even normal changes can influence the whole planning of school activities and grade requirements; the selecting of materials and equipment; the controlling of environmental factors; and the outlining of schedules for spacing periods of eye work. Such abnormalities as eye defects, disease, or conditions in general health affecting the child's vision should be recognized and removed or at least rendered more tolerable for the child.

In some school systems the entire school program for eye health is based upon whether the child is able to read 20/20 on a chart. Not much attention is paid to the kind of chart, whether it is one drawn according to the scale of Snellen measurements, or whether it is clean, and no universal attempt is made to make tests under consistent standards of lighting.

Eye Difficulties Among School Children

It is pretty safe to assume that the majority of school nurses, if asked what eye condition is most frequently found among elementary school children, would reply without hesitation, nearsightedness (myopia). But ask the ophthalmologist and he will tell you farsightedness (hyperopia). A further investigation indicates that the ophthalmologist's statement can be substantiated by research.[1] The most common eye difficulties found among elementary school children are:

1. Errors of refraction of varied degrees and seriousness, occurring in the following order of frequency: hyperopia, astigmatism, and myopia.
2. Failure of the two eyes to work together, arising from a variety of causes, and generally referred to as strabismus or squint.
3. Eye diseases affecting the different parts of the eye.
4. Congenital and hereditary eye defects.

There is probably no part of the school health program, in pro-

portion to its importance, that is hung on so fragile a thread of factual information as the program for ocular hygiene. This is true in spite of the importance of the visual mechanism and the exciting facts that are known about it—how sight is possible and how various parts of the eye perform their functions; the part that light plays in vision; and the relationship between the eyes and the rest of the body.

Present-day methods in education are so largely dependent upon the eyes—some authorities stating that more than three-fourths of our impressions come through the sense of sight—that there is a definite obligation for considering and appreciating the rôle that vision plays in the educational process and the effect it can have on the behavior of the child. If it were possible to perfect our tests of vision and to equip ourselves with testing materials which would enable us to see exactly the way a child sees when he has visual limitations—in other words, put ourselves in his place—how much better prepared we should be to interpret his actions and to help in directing his education.

A museum in New York City is planning to add to its exhibits in the near future a hall of animal behavior, which will, among other things, permit the visitor to view everyday scenes in the way in which they are supposed to be seen by different animals. The physiologic, the psychic, and the physical aspects of the vision of animals will be dramatically represented. One project is being designed to show how the dog sees. Lacking color discrimination, the dog sees everything as a pale gray. Brown, red, blue, and white details are missing in the dog's world. This is a physiologic difference between the eyes of the dog and those of the child, unless, of course, the child lacks color discrimination. "Color blindness" in the child may prevent him from entering certain occupations or may make him a menace in traffic when he grows older and learns to drive. If his lack of color discrimination is not discovered early, it may even be necessary for him to give up the profession for which he has prepared himself.

In the physiologic sense, deviations other than color blindness occur. There may be changes in the vascular system of the eye, in the metabolism of the eye, or defects in structure of the eye which impair its function. If such defects do occur, the child may see

things larger or smaller than they are and he is likely to be misunderstood when he reports to the teacher or his parents *what he actually sees.* Words may appear blurred or run together, making sustained attention difficult and, as a result, exploring the printed page becomes a tedious task rather than a joyful and satisfying experience.

Because of these defects in normal functioning, the child may be unable to see the blackboard and thus he misses many stimuli used by the teacher. These instances will serve to point out the need for a better understanding of at least the rudimentary facts about the eye—how the child sees—and what may happen if there is any interference with his vision.

In the museum's hall of animal behavior, another exhibit will show how psychic factors may be responsible for distorted vision. Among animals, the hen, because of psychic factors, sees things much larger than they actually are. Among school children, psychological differences may account for distortions in their art work. Various ophthalmologists have pointed out limitations imposed on individuals in the field of sculpture and painting when vision is affected. An illustration of the influence of psychic factors in painting can easily be found in the works of Van Gogh.

Fish see the fisherman on the bank in grotesque proportions. This is due largely to physical factors—the reflection of light and the refraction or bending of the rays of light. There are physical factors in the child's world which influence his vision. The intensity and the quality of light determine his acuteness of vision. His eye comfort and efficiency are definitely affected by inadequate illumination. Seeing is handicapped if glare (brightness in the field of vision) is present.

School Lighting Requirements

It has been demonstrated that it takes twice as long to see at three foot-candles of illumination as at thirty foot-candles. Yet how many children still have less than the minimum requirement of light on the working surface of their desks? Children with defective vision benefit under conditions of good lighting because it takes the defective eye longer to see than the normal eye. In any consideration of the vision of the school child, teachers, nurses, and

physicians should be informed at least as to what are the minimum standards of school lighting. How many school nurses know that since 1918 there has been a code of lighting school buildings, that the American Standards Association's rules of procedure were followed in preparing the code, and that an up-to-date revision of the code, *American Recommended Practice of School Lighting,* will be available in another six months. This bulletin will contain not only criteria of good illumination, but also helpful information concerning the control of school lighting, decoration of schoolrooms for securing best reflective values, and seating in relation to light sources and working surfaces.[2]

It is impossible to include in this paper more than a suggestion of the diseases and conditions which may affect the various parts of the eye and seriously impair vision. Diagnoses of eye conditions of children attending sight-saving classes are worth noting. Some of these are: albinism, choroiditis, congenital cataract, corneal opacities as the result of disease or injury, detached retina, interstitial keratitis, optic atrophy, phlyctenular keratitis, progressive myopia, and retinitis pigmentosa.

The nurse who understands the significance of eye difficulties, who has knowledge of the eye and a sensitivity to symptoms, has many opportunities for helping to prevent loss of vision. In many instances she may be able to prevent the occurrence of eye difficulties. Briefly, this can be done by participating in programs to prevent eye conditions brought about by syphilis, tuberculosis, local infections of the eye, focal infections, and injuries.

It is possible only to ask this question, since facts are not available for answering it. How many in the United States of the 114,000 blind persons and the thousands of other persons with partial vision could have had eyesight conserved if proper measures for eye care had been applied throughout their school life?

Vision of the Preschool Child

An eye health service, to be most effective, should be an integral part of the school health program. But planning for the preventive aspects of an ocular hygiene program which is directed toward conserving the vision of the school child, must begin with the preschool age group. A physical examination for the preschool child is be-

coming a regular part of his preparation for school. There is, however, a most important part of this service to the preschool child that is being omitted. More attention should be given to the detection of eye difficulties and their alleviation.

It is frequently said that the incidence of eye defects in the preschool group is negligible, and that the findings do not justify the time and effort involved. Many of these statements are opinions based on broad generalizations. What has been the experience of the National Society for the Prevention of Blindness? A study[3] made as long ago as 1925 indicated in the summary that "almost as large a percentage of children of the preschool age have eye difficulties requiring careful study by ophthalmologists as have children of older age groups. The only striking difference that stands out clearly in this study is the higher incidence of hyperopia (farsightedness) and the lower incidence of myopia (nearsightedness) in the preschool group."

The incidence of eye difficulties in the preschool group is approximately twenty per cent, based on this study, and the incidence of eye conditions in the school group has been found to be about twenty per cent, based on studies made of this age group.

Inspecting and testing the eyes of the preschool child require time and patience. The child's co-operation and sustained attention are necessary. A quiet room, small groups of children, preliminary instructions to the mother in what is expected, and practice at home in learning the different positions of the Symbol E—all make for more accurate results.

If a check list were prepared for scoring the activities in a school system which have to do with the vision of the school child, basic items would be included. These items merit at least brief mention.

Is there an eye health education program for teachers and nurses? Does the program include manuals for guidance regarding testing vision and recording of eye conditions; control of environmental factors; adjustment of classroom practices?

What are the facilities in the community for eye care and for general care for those diseases of general health which may affect the eyes?

Are there facilities for special education of visually handicapped

—both the partially seeing group and the blind—in public school classes, parochial schools, private schools, state residential schools?

Are the eye findings recorded? Is provision made for the following items: acuity of vision of both eyes; fields of vision; treatment advised, whether eye care or other; limitation of eye tasks; and educational guidance.

Realizing the importance of vision, and armed with what facts are available, we can widen the school child's horizon, enrich his visual experiences, and conserve his most useful possession—eyesight. This is a privilege that all of us should exercise freely. When physicians, nurses, and teachers realize the ocular hygiene needs, school children everywhere will be benefited. For in the words of the prophet Isaiah, "they shall see eye to eye."

References

1. "Report of the Committee of Inquiry into Problems Connected with Defective Vision in School Children." 1931. Available from British Library of Information, 260 Madison Avenue, New York, New York.
   Kempf, G. A., Collins, S. D., and Jarman, B. L., "Refractive Errors in the Eyes of Children as Determined by Retinoscopic Examination with Cycloplegic," Bulletin 182, United States Public Health Service, 1928, p. 12.
2. "Standards of School Lighting—With Suggested Requirements for a School Lighting Code," American Standards Association, 29 West 39th Street; Illuminating Engineering Society, 51 Madison Avenue; American Institute of Architects, 115 East 40th Street, New York, New York.
3. "The Vision of Preschool Children. An Analytical Study of 982 Children." Publication 66, National Society for the Prevention of Blindness, 50 West 50th Street, New York, New York.

Editorial

The Growth of Sight-Saving Classes in the United States

WE celebrate this year the twenty-fifth anniversary of the establishment of sight-saving classes in America. The first of these special classes for school children with seriously defective vision was started in Boston, Massachusetts, in the spring of 1913, and a second class was started in Cleveland, Ohio, several months later. Today there are 571 such classes in 185 cities throughout the United States, including the District of Columbia and the Territory of Hawaii.

The idea of special methods for educating partially seeing children was brought to this country in 1909 by Dr. Edward E. Allen, then director of the Perkins Institution for the Blind, after visiting the myope classes in London. He persisted in his efforts until the public school authorities of Boston decided to inaugurate a class for children suffering from serious eye difficulties. The movement has grown steadily ever since.

Although classes of this kind existed in England and Germany before they were begun in America, we have gone much further. Not only do we have a larger number of sight-saving classes than any other country, but the pedagogic technique and the special facilities developed here have won recognition throughout the world.

In sight-saving classes, every child is taught the touch system on the typewriter as soon as possible so that the eyestrain of handwriting may be avoided. Books in large type are used, and much of the work is done on the blackboard. Adjustable seats and desks are provided, and particular care is exercised in regard to lighting arrangements.

Thousands of American children, through these classes, have received an education that would not have been possible for them under the usual conditions provided for the normally seeing. In addition, many of them have received guidance in the selection of

vocations which they are capable of pursuing, within the limits of their eye defects, and which will not increase their visual handicaps.

The steady growth in the number of sight-saving classes has created a need for teachers and supervisors who are trained in this special field; and an increasing number of states are requiring teachers to meet certain qualifications before they can be certificated.

For many years, the National Society for the Prevention of Blindness has co-operated with colleges and universities offering summer courses that provide such training. Four colleges gave courses during the summer of 1937, with a total enrollment of 120 students; and an even larger enrollment is anticipated for the courses scheduled at seven colleges and universities during the summer of 1938.

The Forum

THIS section is reserved for brief or informal papers, discussions, questions and answers, and occasional pertinent quotations from other publications. We offer to publish letters or excerpts of general interest, assuming no responsibility for the opinions expressed therein. Individual questions are turned over to consultants in the particular field. Every communication must contain the writer's name and address, but these are omitted on request.

The Program of Prevention of Blindness as It Relates to Nursing

The National Society for the Prevention of Blindness has on its staff a registered public health nurse as associate for nursing activities, whose function it is to assist all groups of nurses in meeting the eye health problems with which they are faced. This is done through personal conference in office and field, through correspondence and through assistance in the selection and use of the Society's publications, and through aid in the development of community eye health programs. Services of other members of the Society's staff are also available to aid in special problems or projects.

To Instructors in Schools of Nursing

Teaching materials and devices, such as publications, slides, and films suitable for teaching eye hygiene to student nurses.

Consultation on methods of correlating eye hygiene instruction with other subjects in the curriculum.

To Nurses Who Have Administrative Responsibilities in Hospitals and other Institutions

Consultation on problems of eye hygiene related to staff and patients.

Information on lighting in relation to eye health and comfort.

To Private Duty Nurses

Information regarding eye diseases and defects and their relation to general health.

To Public Health Nurses Engaged in:

General Public Health Nursing

Information regarding normal growth and development of the eye and the relation of other health problems to eye health.

Assistance in correlating eye and social hygiene programs.

School Health Service

Information on the relation of vision to learning.

Guidance as to sources of standards in such problems as school lighting.

Consultation on methods of discovering eye health problems, such as vision testing, school lighting and seating, and other school equipment.

Interpretation of principles of sight-saving class practices.

Industry

Guidance as to sources of standards for lighting and the protection of eyes in industry.

Information on eye hazards in industry.

Suggestions for eye health programs in industry.

To Nursing Organizations (State and District Nursing Associations and Organizations for Public Health Nursing)

Assistance in planning programs related to eye health.

Exhibit materials and publications for use at meetings.

The Objects of the Society

1. To endeavor to ascertain, through study and investigation, any causes, whether direct or indirect, which may result in blindness or impaired vision.
2. To advocate measures which shall lead to the elimination of such causes.
3. To disseminate knowledge concerning all matters pertaining to the care and use of the eyes.

Note and Comment

3,500 Cases of Preventable Blindness!—Figures on eye injuries recently released by the Wisconsin State Board of Health show that eyesight has been lost to more than 3,500 Wisconsin residents through tragedies that for the most part could have been prevented.

Blindness at birth in Wisconsin has been almost eliminated since 1913, through the statute requiring the use of silver nitrate in the eyes of every infant at birth. A survey in 1934 revealed that less than one per cent of the State's known blind were under five years of age, eight per cent were from six to 20, 25 per cent were 21 to 49 years, 12 per cent were in their fifties, and 55 per cent had reached or passed 60 years.

The Board indicated that reading in poor light or under other circumstances leading to eyestrain, and allowing an inflamed condition of the eyes to go untreated, are common faults. Other leading causes are accidents, both in industrial plants and in the home. The former have been lessened through safety rules effective in shops, but the accident hazard to the eyesight of children persists.

Columbia University Gives Course in Illumination.—A course in the "Illumination of Buildings" is being presented at Columbia University during the spring term of 1938 for the second time. The course, which consists of lectures presented by practicing engineers, provides basic and technical information dealing with lighting problems and their solutions. The topics include: co-ordination of light and architecture; fundamental terms of illumination; lighting for seeing; incandescent and gaseous light sources; lighting standards; specifications and calculations; light control; electric service in the home; color in lighting; commercial, industrial, and residential lighting; stage lighting, decorative and exterior lighting; and modern trends and future possibilities in lighting.

President Roosevelt Approves Prevention of Blindness Law.—The President has approved an act (Public Law No. 58) providing for the prevention of blindness in infants born in the District of Columbia. The act devolves a duty on each physician, midwife, or other person in attendance on any case of childbirth to administer immediately on delivery a prophylactic against inflammation of the eyes of the baby, either a one per cent solution of silver nitrate or such other preparation as the health officer may prescribe. Whenever any physician, midwife, or other person in attendance on any case of childbirth finds that the baby has inflammation of the eyes, attended by a discharge therefrom, notification must be given in writing within six hours to the health officer, who may order the parents of the child either to place the child in the care of a registered physician or to submit immediately satisfactory proof of inability to pay for such medical services. If the health officer finds that the parents are unable to pay for such medical treatment, he must order the parents to place the child in a hospital to be designated by the Board of Public Welfare and at the expense of the Board. No person other than a registered physician is permitted to treat any case of inflammation of the eyes of a newborn child, attended by a discharge therefrom, for any period longer than may be necessary to obtain the services of a registered physician.

Lighting Requirements for Weaving.—The minimum number of foot-candles required for the various processes in weaving varies considerably, as is shown by the following chart:

	Minimum No. of foot-candles
Soaking and Fugitive Tinting	10
Winding	
On Swifts and Spools	25
Twisting	
On Spools and Bobbins	25
Conditioning or Setting of Twist	10
Rewinding and Coning	
On Spools or Cones	25
Quilling	
On Spools and Quills	25

	Minimum No. of foot-candles
Warping—Silk System	
On Creel	50
On Running Ends	50
On Reel	50
On Warp at Beaming End	50
Warping—Cotton System	
On Creel	50
On Beam	50
Slashing	
On Beam	25
Drawing-In	
On Heddles	100
On Reed	100
Weaving	
On Woven Cloth	25
On Heddles and Reeds	5
On Warp Back of Harness	10

From two to three times the values given should be considered the minimum when weaving cloth with colored threads is involved.

Indiana Requires Eye Examination for Drivers.—An automobile driver's license law which became effective in Indiana January 1, 1938, provides for an eye examination as one of the requirements for passing a beginner's test. Should the applicants fail to pass the eye test, they are rejected with the examiners' recommendation to consult optical experts.

Medal Offered for Work in Ophthalmology.—The University of Buffalo awards annually a gold medal for work in ophthalmology. Details may be obtained from Dr. Harold W. Cowper, 543 Franklin Street, Buffalo, N. Y.

Better Light for the Bull's Eye.—Improvement in the lighting fixtures installed in the Buffalo Rifle and Revolver Club has made a marked improvement in the scores of its members. For four matches played prior to the change in lighting, the scores were

1,239, 1,287, 1,259, and 1,260. After the lighting had been improved, the scores for the next four matches were 1,335, 1,329, 1,319, and 1,318. It is significant that the lowest score attained after the installation of improved lighting was several points higher than the highest score attained under the previous system of lighting.

Modern Views on Credé's Method.—A survey of 20 recent articles on Credé's method of using silver nitrate solution in the prophylaxis of ophthalmia neonatorum reveals that present-day doctors are not in complete agreement concerning the application of the method. In 15 of the articles the use of silver nitrate was recommended. In three it was considered ineffectual. In the remaining two articles the authors were non-committal as to the drug used, placing more emphasis upon the technique of administering the drug and the cleansing of the eye. In the vast majority of cases, one per cent silver nitrate was used instead of the two per cent originally recommended by Credé. Some of the substitutes for silver nitrate were silver acetate, alum, tannic acid, copper sulphate, zinc sulphate, bichloride of mercury, potassium permanganate, argyrol, mercurochrome, mercurophen, and many others. Several of the authors called attention to the fact that ophthalmia neonatorum includes not only those cases of gonorrheal origin but also many due to inclusion bodies, pneumococcus, streptococcus, staphylococcus, Morax-Axenfeld bacillus, and others. The end result from these non-gonorrheal infections may be just as tragic as those from gonorrheal infection.

Connecticut Bars Defective Sun-Glasses.—According to the Connecticut State Commission of Opticians, "effective April 1, 1938, sun glasses or goggles in which the glass or other materials used as the lenses produce distortion, are not matched in color or density, and which are not in a high degree of clearness or transparency, cannot be sold at retail in Connecticut."

Daylight Meter.—The photometry department of the National Physical Laboratory of London has perfected a meter which automatically measures the amount of daylight penetrating into rooms.

By means of two photo-electric cells the intensity of light in a room is compared with that of the sky vault. It is thus possible to tell at a glance how good or how bad is the lighting of a room. The daylight factor is beginning to be used extensively by the authorities in deciding on slum clearance schemes, for the instrument has the advantage of not being subject to errors of judgment on the part of the user. The minimum daylight factor considered suitable for working conditions is 0.2 per cent. In some of the Glasgow slums the factor is as low as 0.003 per cent.

Another apparatus is used for testing the sensitivity of the eye to colored light, with special reference to colored street lights. It has been suggested that the eye may work most efficiently by the light of some particular color. To test this theory a cinema film of a street scene was prepared in which various objects appear and disappear. This is projected on a screen by means of lights of different colors. The time taken by observers to notice the various objects is measured for the different colors.

Smoke in His Eye.—So far as is known to medical science, Alfred Langevin, a French-Canadian, is the only man in the world who can breathe and smoke through his eye. With his nose and mouth tightly closed, he can exhale and inhale through an anomalously patent nasal duct on the right side; and by means of a special apparatus, having a tube which passes down through this duct, with a nose-clip to keep it in place, he smokes cigars, cigarettes, or a pipe. Strong tobacco causes his eyes no irritation.

Significance of Colors.—The percentage of light reflection by factors of walls, ceilings, and window shades, registers largest with new white, which investigators of public health have found to be nearly 90 per cent. Buff reflects light up to 66 per cent; cream up to 80 per cent; light green up to 75 per cent, and dark green varies from 11 to 25 per cent. The reflection of light blue and pink is around 61 per cent. Yellow runs high but natural wood brown stains and wood varnishes are low in reflection.

Women Want Better Light.—Better lighting was found to be one of the most desired improvements in working conditions for

women, in a recent survey by the Northwestern National Life Insurance Company. The survey included about 2,600 "white collar" workers in 22 cities, and dealt with such matters as diets, career preferences, and working conditions. Among the women, poor light ranked second as a cause of dissatisfaction.

Examinations to be Given by American Board of Ophthalmology.—The American Board of Ophthalmology announces that in 1938 it will hold examinations in San Francisco, June 13, during the American Medical Association meeting; in Washington, D. C., October 8, during the American Academy of Ophthalmology and Oto-laryngology meeting; in Oklahoma City, November 14, during the Southern Medical Association meeting. A preparatory group has been established to furnish information and advice to physicians who are studying or about to study ophthalmology so that they may be eligible for examination and certification, after they have fulfilled the necessary requirements. Any graduate or undergraduate of an approved medical school may make application for membership in this group. Upon acceptance of the application, information will be sent concerning the ethical and educational requirements, and advice to members of the group will be available through preceptors who are members or associates of the Board. Members of the group will be required to submit annually a summarized record of their activities. Application blanks may be procured from Dr. John Green, 3720 Washington Avenue, St. Louis, Mo.

American Recommended Practice of School Lighting.—Sponsored by the Illuminating Engineering Society and the American Institute of Architects, and approved by the American Standards Association, the new "American Recommended Practice of School Lighting" has recently come off the press. In this new edition, the primary purpose has been to establish criteria of good illumination for the guidance of architects, engineers, school officials, and others interested in the conservation of children's vision and the efficiency of pupils and teachers. The edition has been materially enlarged to include sections on the vision problems confronting students and

teachers; the factors that affect seeing and lighting; the problems involved in a natural and artificial lighting of schoolrooms; how and when natural light may be augmented by artificial light under varying weather conditions; and the matter of adequate wiring.

Single copies of the new recommendations are priced at 25 cents each, with quantity prices obtainable on request from both the Illuminating Engineering Society, 51 Madison Avenue, New York City, and the American Standards Association, 29 West 39th Street, New York City.

The Greeks called it "Strephosymbolia."—Reading disability which occurs even among children of normal vision and high intelligence may often be due to "strephosymbolia," a word meaning "twisted symbols," because the afflicted person distorts or twists the arrangement of letters which form a word. Children so affected are not word-blind. They see the word on the printed page, but are unable to recall the mental picture of the word which they have just seen. No entirely satisfactory explanation for the existence of strephosymbolia has been put forward. It has been variously blamed upon emotional disturbances, upon a general indifference toward all forms of school work, upon lack of harmony between teacher and pupil, and upon faulty home training. It is probably aggravated in some degree by the sort of fear neurosis which may develop in a child who is anxious to succeed but lives in constant anticipation of failure.

Children revealing this tendency can often be cured by making use of their normal development in spoken language and by teaching them the phonetic values of the printed letters and the process of blending such letters in sequences.

Money Burned is Money Earned in Mining Illumination.—Although in most industries the expenditure for modern lighting is over one per cent of the production cost, in mining only about one-half this amount is usually allowed for lighting, a "saving" which is highly imprudent when it is considered that the total cost of accidents in mines is between 20 and 25 per cent of the payroll. As an essential part of the operations, lighting also directly influ-

ences production. In cases where expenditures have been made for improved lighting in mines, the benefits have been speedily realized.

Learning Through Vision.—Confirming the general belief that the eye is the most important organ in learning, Dr. Joseph J. Weber of the University of Texas has recently made psychological tests showing the following percentages for learning through the various senses: visual, 46 per cent; kinaesthetic, 22 per cent; auditory, 18 per cent; instinctive, 8 per cent; cutaneous, 4 per cent; and olfactory and gustatory, 2 per cent.

Social Security Board Defines Economic Blindness.—Thirty-six states are now co-operating with the Social Security Board in granting financial assistance to the needy blind. The Board has set up a definition of blindness which is based on the definition of economic blindness proposed by the American Medical Association in 1934, and differs but little from that definition. It reads as follows:

"In general, central visual acuity of 20/200 or less in the better eye with proper correction has been considered as economic blindness. An individual with central visual acuity of more than 20/200 in the better eye with proper correction is usually not considered blind, unless there is a field defect in which the peripheral field has contracted to such an extent that the widest diameter of the remaining visual field subtends an angular distance no greater than 20 degrees."

Syphilis as an Etiologic Factor in Blindness.—Alfred Cowan, consulting ophthalmologist to the Blind Pension Fund of Pennsylvania, has recently stated that there are approximately 14,000 known blind persons in the State of Pennsylvania. This number represents probably half the total blind in this commonwealth, because many who are blind do not apply for pension. Of this number he estimates 5 or 6 per cent are blind due to syphilitic optic atrophy. He has found syphilis the etiologic factor in blindness in 566 cases out of a total of 1,898 in a series tabulated which

did not include cases of blindness due to trauma, senility, and congenital anomalies.

Vision of Animals.—As a preliminary to studying the visual acuity of human infants, John Warkentin, a young scientist at the University of Rochester, has been experimenting with animal vision. His apparatus consists of a vertical hollow cylinder, five feet high and four feet in diameter, in the inside of which are vertical black and white stripes ranging from five inches down to $\frac{1}{16}$ of an inch. If an animal placed inside the cylinder makes eye or head movements following the rotation of the cylinder, it is assumed that it can see the stripes, and the narrower the stripe perceived, the sharper the vision is assumed to be. Through the use of these tests it was found that:

White rats, white mice, and Gila monsters have extremely poor vision. Frogs, toads, alligators, and opossums have poor vision. Snakes, contrary to popular supposition, have good vision. Those tested included garter snakes, king snakes, ribbon snakes, and rattlesnakes. Their vision is poorest just before shedding their skins and best just after shedding, because the snake's cornea grows opaque as shedding time nears and is sloughed off with the skin. Turtles, woodchucks, guinea-pigs, rabbits, and gophers have good eyesight. Cats and birds see best of all.

Guinea-pigs and dogs vary greatly from one individual to another. Monkeys could not be tested because they kept peering curiously over the cylinder's top. Wild rabbits see better than tame rabbits; normally pigmented creatures see better than albinos.

Yellow Blackboards.—The British National Institute of Industrial Psychology has recently published a report which threatens to put the blackboard along with the slate among educational antiquities. In copying from a blackboard children have to move their eyes from a black surface with a reflection factor of 10 to 15 per cent to a white surface with a reflection factor of 85 to 90 per cent. The object of the work done by the Institute was to determine whether a board with a far higher reflection factor than the blackboard would enable children to copy from it more quickly and with

less eyestrain. As a white board would be likely to cause glare, a light yellow board was chosen for the experiments. Blue was chosen as the color of the chalk. Two methods—a laboratory reaction-time test and classroom tests—were used. The results showed clearly that the words on the yellow board were read more rapidly than those on the blackboard, the average difference being 15.4 per cent. In the classroom experiments the speed of copying the usual white letters on a black board was compared with that of copying dark letters on a light board. The results pointed definitely in the same direction: the children were found to copy nearly 10 per cent more in the same time from the yellow board than from the black board. Further investigation is being made to find out what are the most suitable materials for colored boards found best from the visual standpoint.

Specs Before the Eyes.—In sprightly phrases J. C. Furnas, in a recent issue of *The Saturday Evening Post*, presents a popular survey of spectacles, giving their history with many oblique comments on the human idiosyncrasies revealed in fashions in glasses and enumerating the mishaps which may befall the human eye. Although the article is written in whimsical vein, the statements are well documented and present valuable information to the lay reader.

Summer Round-Up of Children.—With an objective of correcting and preventing remediable defects in children, especially those between the ages of one and five, the Summer Round-Up of the National Congress of Parents and Teachers will be opened by local parent-teacher associations beginning May 15.

Do You Have These Issues?—The Sight-Saving Review, having exhausted its supply of the following issues, will pay fifty cents for each copy returned to its office: Vol. I, No. 3; Vol. V, Nos. 2 and 3; Vol. VI, Nos. 1, 2, 3, and 4; and Vol. VII, No. 2.

National Society Notes.—The Society was represented at the annual meeting of the International Association for the Prevention

of Blindness and at the Fifteenth Ophthalmological Congress held at Cairo, Egypt, by Dr. Park Lewis, first vice-president, and Mr. Lewis H. Carris, managing director. Upon his return Mr. Carris was called to Tennessee to aid in formulating a new state program for the prevention of blindness.

In talks given before two groups of illuminating engineers, Mrs. Winifred Hathaway, associate director, stressed the importance of correct lighting as a means of conserving vision. On January 13 she spoke at the Residence Lighting Forum of the General Electric Company, held at the Grand Central Palace, New York City, and on March 29, at the Edison Electric Institute in Chicago, she delivered a paper on "Sight Saving: A Co-operative Program." Other co-operative activities in which she took part included an address at the luncheon meeting of the Sight-Saving Council of Cleveland on February 16; participation in the International Council for Exceptional Children, held at Buffalo, N. Y., February 17–19; and attendance at the National Education Association Convention in Atlantic City, February 28–March 5.

This convention was also attended by Miss Anette M. Phelan, Ph.D., staff associate in education, who, on behalf of the Society, conducted the breakfast meeting of the Advisory Committee for Teacher Education, where she presented a report on "Eye Health in Teacher Education." From March 21–24 she visited Syracuse University, Syracuse, N. Y., where she conferred with administrative officers and faculty of the University regarding eye health problems of the students and proposed the inclusion of an eye health program in the curricula for high school teachers.

Mrs. Eleanor Brown Merrill, associate director, and Miss Eleanor W. Mumford, R.N., the Society's new associate for nursing activities, attended the Conference on Better Care for Mothers and Babies called by the Children's Bureau in Washington, D. C. Mrs. Merrill's activities in the work of the Interorganization Committee on Sight Conservation included field visits to Columbia, S. C., and Concord, N. H.

At the invitation of the Pennsylvania Association for the Blind in Wilkes-Barre, Pa., on February 10, Miss C. Edith Kerby, statistician, spoke at the Institute for Public Health Nurses on "Sta-

tistical Guideposts in the Prevention of Blindness Movement." Following this, she was called by the Indiana Department of Public Welfare in Indianapolis, for assistance in the classification of records of recipients of blind assistance. A request for similar services was made in March by the State Department of Public Assistance, Charleston, W. Va.

Radio talks delivered by staff members proved an effective medium of informing the lay public on care of the eyes. On January 10 Miss Isobel Janowich, editor, spoke on "Save Your Eyes," and on January 21 Miss Regina E. Schneider, secretary, gave a talk on "Eye Health." In a radio interview of the Women's Round Table of the Air, Mrs. Winifred Hathaway answered questions which frequently arise in the mind of the layman concerning eye care.

Current Articles of Interest

Some Practical Experiences with Contact Lenses, Alexander G. Fewell, M.D., *Pennsylvania Medical Journal,* January, 1938, published monthly by the Medical Society of the State of Pennsylvania, Harrisburg, Pa. In the beginning, contact glasses were employed largely for the correction of conical cornea or other corneal irregularities. Gradually, they have come to serve a much wider field. Today they are used to correct not only corneal deformities but myopia, hyperopia, high degrees of astigmatism, nystagmus, aphakia, and in many cases they are used for cosmetic purposes and for safety, in athletics. They are also used as a protective device and a therapeutic aid in certain pathologic conditions of the eye and lids.

Although these glasses correct all corneal astigmatism, they are not suitable for those with any great amount of lenticular astigmatism. Needless to say, they cannot help those with much depreciated vision caused by a diseased condition of the eye.

The main disadvantage of contact lenses is the great amount of time and trouble required to prepare them and to determine whether the patient can tolerate them at least for a period of three hours. This in turn leads to the further disadvantage of a cost which is in many cases prohibitive.

Management of Eye Injuries, M. C. Baker, M.D., *Kentucky Medical Journal,* February, 1938, published monthly by the Kentucky State Medical Association, Bowling Green, Ky. Stressing the importance of treating all eye injuries as serious, the author discusses the types of injuries most frequently encountered in industry and indicates treatment in each case. The figures which he quotes on industrial eye accidents present a striking picture of the serious nature of eye injuries from the viewpoint of compensation.

National Policy to be Adopted in a Tropical Country for the Prevention of Blindness, A. F. MacCallan, C.B.E., *British Journal of Ophthalmology,* February, 1938, published monthly by George Pulman and Sons, Ltd., London, England. Opening with a discussion of the history of blindness in Egypt, the author, an authority

on trachoma, analyzes the statistics of the Ophthalmic Hospitals of Egypt and elaborates on the reasons for the prevalence of such diseases as ophthalmia neonatorum and trachoma, as well as diseases which lead indirectly to blindness, such as smallpox and vitamin deficiency diseases. He then makes a survey of the means of preventing blindness, through the establishment of hospitals and clinics; laboratory studies; examinations of school children; and sanitary measures. The advances made since 1911 show that these measures have been effective to such an extent that the percentage of blindness among patients in the Egyptian Government Ophthalmic Hospitals has decreased more than two-thirds.

Vitamins in Treatment and Prevention of Ocular Diseases, Arthur M. Yudkin, M.D., *Archives of Ophthalmology*, March, 1938, published monthly by the American Medical Association, Chicago, Ill. Analysis of laboratory statistics and clinical observations reveals that vitamins play a definite rôle in the therapy of ocular diseases. Vitamin A seems to be useful in the treatment of corneal inflammations and chorioretinal disturbances. The normal function of the rods and cones of the retina is enhanced by the use of vitamin A. Vitamin B complex is useful in the treatment of toxic amblyopia, particularly that produced by the use of alcohol and tobacco. In patients in whom focal infection is thought to be the underlying cause of the ocular inflammation, a combination of vitamin A and B complex is helpful. Vitamin C has been used for extravasation of blood in the vitreous, choroid, and retina, but the author finds that lemon juice is more beneficial. Lemon juice is also helpful in ocular disturbances in which the lesion may be caused by improper vascular compensation. At the present time no definite use in ophthalmology is indicated for vitamins D and E.

The Significance of Heredity in Ophthalmology. Preliminary Survey of Hereditary Eye Diseases in Tasmania, J. Bruce Hamilton, *British Journal of Ophthalmology*, February, 1938, published monthly by George Pulman and Sons, Ltd., London, England. In a study of 53 unselected pedigrees, the general conclusion is that hereditary eye disease in Tasmania conforms to Mendel's laws and may be either dominant or recessive, but is usually recessive and occurs more frequently in males than in females, although females who are not themselves affected frequently act as carriers.

The Nature of the Visual Process, Selig Hecht, *Bulletin* of the New York Academy of Medicine, January, 1938, published monthly by the New York Academy of Medicine, New York. A lecture given before the Harvey Society, tracing the history of experiments in the physiology of vision. It is an up-to-date survey of subjects which have declined in interest during the past 30 years, although experiments are still being made. The author concludes that much is expected from the direct photochemical and chemical approach to the study of vision, and it is to be hoped that the next few years will witness the fruition of these efforts.

A Study of Miners' Nystagmus, Raymond S. Brock, M.D., *British Medical Journal,* February 26, 1938, published weekly by the British Medical Association, London. This paper, based on a study of nystagmus in 15 pits of North Wales over a period of 10 years, discusses the eye movements and theories of causation of nystagmus, and outlines suggestions for the prevention of this frequent affliction of miners.

Hygienic Lighting in the Home, Miles A. Tinker, Ph.D., *Journal of Home Economics,* March, 1938, published monthly by the American Home Economics Association, Washington. A discussion of: (1) intensity of light, (2) quality of light, and (3) distribution of light, as determinants of hygienic illumination. The author summarizes the findings of recent experiments in lighting and applies them to the home. The distribution of light is of especial importance, and it is emphasized that "no light source should be in the visual field during visual work if the best working conditions are to be maintained."

Technique of Goniotomy, Otto Barkan, M.D., *Archives of Ophthalmology,* February, 1938, published monthly by the American Medical Association, Chicago. Goniotomy, or the opening of Schlemm's canal under direct vision, is an operation for the relief of that form of chronic glaucoma which is characterized by an open angle and normal depth of the anterior chamber. The success of the operation depends on two essential factors: (1) the proper selection of suitable cases by a preoperative biomicroscopic examination of the angle of the anterior chamber, and (2) the use of a

specially made contact glass, the prismatic action of which provides a magnified picture of the inside of the angle of the anterior chamber, so that the surgeon is able under direct vision to guide his knife from the temporal limbus across the anterior chamber until it strikes the trabeculum on the opposite side.

Results in the 25 eyes operated on reveal that the tension in those cases in which the trabeculum has been incised over one-fourth of its circumference has been normalized to date, the longest period of observation being two years. In other cases in which the incision was insufficient in extent the tension has been normalized, but only with the additional use of miotics. The tension in these cases, however, was improved by the operation, since miotics had been insufficient to normalize it before operation. It seems likely that with the present improved technique a high percentage of completely successful results will be maintained and that re-operation will be required in only a few cases in which the results were incomplete.

The essence of goniotomy is its complete safety. No complications or injurious sequelae have been observed in any case in which the operation has been performed. This makes it especially adapted to early operation, which is the greatest need in the surgical treatment of glaucoma today.

Management of Intraocular Foreign Bodies, David F. Gillette, M.D., *New York State Journal of Medicine*, March 1, 1938, published semi-monthly by the Medical Society of the State of New York, Albany. The first step in the treatment of intraocular wounds is an exact, searching history, including the possibility of an injury, the type or manner of work, whether the machines, tools, and metals used are magnetic, and the proximity to and occupation of fellow workmen. The second essential is a methodical examination, including a search for wounds of the lids, especially their margins, of the cornea, conjunctiva, sclera, iris, lens capsule and cortex, together with a careful study of the anterior chamber, vitreous, and all visible portions of the fundus.

The magnet and x-ray are invaluable aids to diagnosis, and should aid in the choice of route. The route of operation depends on the entrance wound—the trauma—and the size, shape, and location of the foreign body.

Senile Changes and Degenerations of the Human Eye, Benjamin Rones, M.D., *American Journal of Ophthalmology*, March, 1938, published monthly by the Ophthalmic Publishing Company, St. Louis, Mo. The old adage that "a man is as old as his arteries" is applicable to the changes that occur in the eye during advancing years. Vascular changes are of fundamental importance. Impaired nutrition resulting from this will explain the deposition of fat globules in the various structures. It is also well known that initial proliferative changes leading to subsequent degenerations are attributable to faulty circulation.

The Treatment of Ocular Syphilis, Daniel Kravitz, M.D., *American Journal of Ophthalmology*, February, 1938, published monthly by the Ophthalmic Publishing Company, St. Louis, Mo. This article is devoted chiefly to the use of drugs in the treatment of ocular syphilis, with emphasis on the importance of early treatment. The drugs used in syphilis are arsenic, bismuth, mercury, and the iodides. Of these, by far the most important are the arsenicals, because they are the only drugs that are actively treponemacidal. Except tryparsamide the arsenicals are contraindicated if the kidneys are impaired, in debility, and in advanced cardiovascular disease.

The arsphenamines may cause ocular reactions which are classified in three groups, as follows: 1. A true toxic reaction, as shown by a conjunctival hyperemia, chorioretinitis, corneal necrosis, and an exfoliative keratitis associated with an exfoliative dermatitis. 2. Ocular therapeutic shock—the Jarisch-Herxheimer reaction, which may appear as (a) an intensification of an existing lesion, (b) a flare-up of a quiescent lesion, or (c) as the unexpected appearance of an inflammatory process. 3. The third type of reaction is the neuritic or iridic recurrence following insufficient treatment in early syphilis.

Snake Venom: Its Use in Postoperative Hemorrhage of the Eye, W. F. Swett, M.D., *California and Western Medicine*, March, 1938, published monthly by the California Medical Association, San Francisco. In the author's experience with several stubborn postoperative hemorrhage cases he used moccasin venom in a 1:3000

concentration and found it excellent as a coagulant. Although his study includes only six cases, the treatment in all was so effective that he feels confident in stating that "moccasin venom has a definite place in the control of postoperative bleeding, and also has possibilities as a prophylactic procedure which may be used in intraocular surgery."

Trends in Aviation Lighting, F. C. Breckenridge, *Transactions of the Illuminating Engineering Society,* March, 1938, published monthly except August and October by the Illuminating Engineering Society, New York. The American development of the art of aviation lighting has passed through four periods, which may be characterized as the primitive period, the experimental period, the period of expansion, and the transition period. The period of transition, beginning in 1936, has presented new problems, the solution of which cannot altogether be predicted. Of the new devices brought out during the past year, several appear to be isolated improvements unrelated to any general development of the aviation lighting art. The others all reflect the influence of the improved radio facilities, the heavier traffic, and the higher speed of airplanes. The need now is for more equipment and closer co-ordination with the radio aids. If beacons are to be spaced closer, if floodlights are to be added so that glare will be avoided under all wind conditions, if approach and contact light systems are to be added to existing facilities, lighting engineers must find means of doing them more economically.

Book Reviews

Handbook of Ocular Therapeutics. Second Edition. Sanford R. Gifford, M.D. Philadelphia: Lea and Febiger, 1937. 341 p. ill.

The second edition of this concise book on ocular therapeutics is without question the best presentation of recognized therapeutic methods available at the present time. Pathogenesis and diagnosis are discussed only when they definitely relate to treatment. "Office surgery" alone is considered in detail.

This book may be divided into two major sections. The first part deals with the ophthalmological armamentarium required for adequate office practice; the nature and use of the drugs employed in treating eye diseases; and the peculiar characteristics of vitamins and other accessory food factors of benefit in certain ocular conditions; and, in addition, considers the endocrine glands and their extracts.

An unusual chapter in the first section is the one on specific and nonspecific protein therapy. Discussion of the various immune sera and vaccines and, in particular, of tuberculin in its diagnostic and therapeutic aspects is concise but sufficiently complete. The chapter on physical therapy includes phototherapy, diathermy, roentgen ray and radium irradiation, and the use of the thermophore and massage in relation to eye diseases.

The second part of the book considers the diseases peculiar to the eye and its adnexa. Each disease is considered carefully and adequate treatment is described in detail. Directions are never complicated and the author has tried in every way to make treatment an office procedure, so far as possible. A chapter on some of the more common ocular injuries is included. Diseases such as retinitis pigmentosa and myopia, the treatment of which is based largely upon experimental knowledge, are discussed, and the present day methods are described.

An adequate bibliography is given at the end of each chapter. This book deserves a place in the library of every ophthalmologist, and is a most valuable contribution to ophthalmic literature.

—Conrad Berens, M.D.

Nursing in Diseases of the Eye, Ear, Nose, and Throat—As Practiced in the Manhattan Eye, Ear, and Throat Hospital. David H. Webster, M.D., John R. Page, M.D., Francis W. White, M.D., Alfred G. Langmann, M.D., Andrew A. Eggston, M.D., and Mary P. Brown, R.N. Philadelphia: Saunders Company, 1937. 288 p. ill.

This text, as the title implies, has been prepared for use in a particular hospital. The preface to the first edition (published in 1910) states that the text has attempted to meet the fundamental lacks in the nurse's basic education. This reviewer would feel that some of these lacks had been otherwise met now; and would prefer to see the first nine chapters resolved into one chapter dealing with the application of such fundamental knowledge and of nursing principles and techniques, to conditions of the eye, ear, nose and throat, with some emphasis on the social and preventive aspects of these conditions. The chapters on the eye would certainly be enriched by such treatment. These chapters contain excellent photographs and diagrams; the presentation of anatomy and physiology is especially clear.

—Eleanor W. Mumford, R.N.

Controlled Reading. Earl A. Taylor, Ph.D. Chicago: University of Chicago Press, 1937. 367 p.

Although not a systematic text in diagnostic and remedial practice, this treatise does belong in the important area of reading. It consists of a doctoral dissertation plus considerable supplementary material. It is called "a book for educators and eye specialists." In addition to measurement for diagnosis and treatment, considerable space is devoted to source materials and development of techniques for use by the teacher and in the reading clinic.

Part I consists of an interesting collection of photographs and comprehensive bibliographies of those persons who have been most prominent in reading research. Part II is an exhaustive summary of techniques employed to study eye movements in reading. This includes pictures of the apparatus and illustrative records. The Metron-O-Scope is described in Part III. This is a mechanically operated, short-exposive apparatus used to build up left to right sequences of perception during actual reading. The author's ex-

periments in diagnostic and remedial reading are described in Part IV.

Several approaches were employed in this study of reading disability. Some of the findings follow: The eye movements of failing students were found to be less effective than for children making normal progress. Furthermore, the normal group showed less tendency toward inadequate functioning of the visual mechanism in visual acuity, muscle balance, etc. The author considers that training with the Metron-O-Scope yields better gains than other methods of training to improve reading. Distinctly improved reading status resulted from prism training for fusion, plus Metron-O-Scope reading.

Certain criticisms of the treatise suggest themselves: The control and experimental groups in certain comparisons were not adequately matched in all respects. The author tends at times to magnify the importance of discovered differences. Although the author does get marked improvement through use of the Metro-O-Scope, he has not proved that equal improvement cannot be obtained by other means. Finally, there is a tendency to overemphasize physiological factors as determinants of reading disability.

There are, however, certain distinct contributions in this book. The historical sketches on methods and contributors are outstanding. Attention is called to the application of binocular photographs of eye movements for studying certain types of disabled readers and for certain problems confronting optometrists, oculists, and clinical psychologists. The Metron-O-Scope is fully described. This is likely to prove, from the pupil's viewpoint, a highly interesting method of improving reading. An attempt to co-ordinate the work of eye specialists with that of psychologists and educators is praiseworthy. The book may be considered an important contribution to diagnostic and remedial reading.

—Miles A. Tinker, Ph.D.

Health Education of the Public: A Practical Manual of Technic. W. W. Bauer, M.D., and Thomas G. Hull, Ph.D., with a foreword by Morris Fishbein, M.D. Philadelphia: W. B. Saunders Company, 1937. 227 p. ill.

Workers in the field of public health education will find this handbook of inestimable value. It should serve also as an excellent

textbook for either medical students or journalism students who wish to learn the technic of this work. The authors are exceptionally well qualified, as Dr. Bauer is director of the Bureau of Health and Public Instruction in the American Medical Association and Dr. Hull is director of its Bureau of Exhibits.

"The field of adult health education has been filled largely by workers who have gravitated into it or been propelled into it from allied fields," the authors explain in their introduction. "Without the benefit of formal training and with little more than a keen realization of the vast problem which confronted them, these men and women have gone at the problem from various angles. Each has used to the best of his ability the tools at his command. Principal among these tools are the newspaper, the pamphlet, the radio and the platform. Out of the experience of many workers there has grown up a formidable mass of knowledge and experience. It is now possible to state with considerable definiteness what are the functions, the purposes, the advantages, the disadvantages of the several media which are available to the health educator."

Instead of the lengthy theoretical discussions found in other books on this subject, the authors get down to "brass tacks" immediately, and give us in the clearest sort of language a practical outline of the principal methods by which the public may be kept informed on health matters. To one who is professionally engaged in public health publicity, this very practical book serves as a stimulating reminder of opportunities which exist for reaching the adult population through such media as newspapers, magazines, books, the radio, motion pictures, stereopticon slides, meetings, exhibits, pamphlets, and correspondence.

—David Resnick

Briefer Comment

Year Book of the Eye, Ear, Nose and Throat. E. V. L. Brown, M.D., Louis Bothman, M.D., George E. Shambaugh, M.D., Elmer W. Hagens, M.D., and George E. Shambaugh, Jr., M.D. Chicago: The Year Book Publishers, Inc., 1937. 640 p. ill.

The section by Drs. Brown and Bothman, dealing with the eye, occupies more than one half of the book and consists of many brief

descriptions of disease conditions of the eye, including discussions of clinical cases. The illustrations deal largely with operative techniques and include several progressive studies of diseased eyes which have responded to treatment.

Vocations for the Visually Handicapped. Louise Wilber. New York: American Foundation for the Blind, 1937. 224 p.

This volume is an excellent source of information for the blind in search of a career, but it should more accurately have been entitled "Vocations for the Blind," as it makes no mention of the special training required by the "visually handicapped" who are not blind.

A Layman's Handbook of Medicine. Richard C. Cabot, M.D. Boston and New York: Houghton Mifflin Co., 1937. 542 p. ill.

As this volume was written with special reference to social workers, it stresses those diseases with which the social worker may most frequently come in contact. The section on the eye gives a brief discussion of such common eye troubles as conjunctivitis, keratitis, iritis, and cataract, indicating how the symptoms of each may be recognized. Some discussion is also given to such visual defects as astigmatism, myopia, and hypermetropia. The book is relatively elementary, but is written with such fine common sense that it may well be recommended to teachers and social workers with a limited knowledge of physiology.

Syphilis, The Next Great Plague To Go. Morris Fishbein, M.D. Philadelphia: David McKay Co., 1937. 70 p. ill.

This highly readable text defines the terminology of syphilis, describes the variety of circumstances under which the disease may be acquired, and stresses the importance of prompt medical care. Its purpose is not to shock, but to answer calmly and factually the questions regarding syphilis which most frequently arise in the mind of the layman. Pictorial statistics, posters, and photographs aid greatly in emphasizing the social significance of control of this great plague.

School Size and School Efficiency. Warren C. Seyfert. Cambridge: Harvard University Press, 1937. 316 p.

An investigation to ascertain the extent to which size of school affects the efficiency of secondary schools. Following are the chief subjects discussed: Organization of instruction; teaching staff; program of studies; extra-curriculum; and relationship with other schools.

Health Section Report. New York: Health Section Secretariat, 1938. 242 p.

A reprinting of the papers delivered at the Health Section of the Seventh Biennial Conference of the World Federation of Education Associations held in Tokyo, Japan, August, 1937.

How Adults Read. Guy Thomas Buswell. Chicago: University of Chicago Press, 1937. 158 p. ill.

An analysis of reading habits of adult subjects who vary greatly in educational and occupational background. The study includes eye-movements in reading, oral reading, visual ability, and vocalization in silent reading, and indicates results gained in remedial experiments.

Die Augen ihrer Kinder sind in Gefahr! M. Klímová-Fügnerová, M.D., and A. Steiner. Prague: M. Schulz, Inc. 24 p. ill.

This very attractive paper-bound booklet is notable chiefly for its clever make-up and interesting charts and pictures, which can be understood even by those who are unfamiliar with the two languages in which the booklet is published, German and Bohemian. The text deals chiefly with a simplified discussion of the physiology of the eye and the necessity for proper lighting, illustrated by several "before and after" pictures.

Youth Education Today. Sixteenth Yearbook, American Association of School Administrators. Washington, 1938. 512 p. ill.

This survey of youth education covers the training of youth not only in the classroom but in the more important social relationships within the school walls. The material is compiled by authorities

in the various fields of youth activities, who discuss the most effective means of adjusting young people to the world. The very useful appendices give detailed information about youth-serving organizations and should be of particular value to the teacher with a wide social outlook.

Books Received

Public Medical Services: A Survey of Tax-Supported Medical Care in the United States. Michael M. Davis. Chicago: University of Chicago Press, 1937. 170 p.

The Standardization of an Australian Reading Test. G. A. McIntyre and W. Wood. Melbourne: Melbourne University Press, 1935. 72 p.

School Myopia. Jacob Raphaelson. Privately printed, 1937. 24 p.

Current Publications on Sight Conservation

Note.—The National Society for the Prevention of Blindness presents the most recent additions to its stock of publications. Except for the more expensive ones, single copies are sent free upon request. Unless otherwise specified, they are reprinted from THE SIGHT-SAVING REVIEW. New publications will be announced quarterly.

260. **Sight Begins at Forty,** Ellice M. Alger, M.D. 8 p. 5 cts. The eyes of the middle-aged are subject to many diseases and changes, yet, if properly cared for, they may be as efficient as they ever were in youth.

261. **A Consideration of Student Eye Health from the Ophthalmologist's Point of View,** William L. Benedict, M.D. 12 p. 10 cts. After presenting a brief survey of eye defects encountered throughout life, the author concentrates on the eye problems of the adolescent and youth of college age and indicates that many of these problems may be solved by proper diet, satisfactory refraction, and correct illumination.

262. **The Fifteenth International Ophthalmological Congress,** Park Lewis, M.D., F.A.C.S. 12 p. 10 cts. An account of the activities during the Congress and a vivid description of the atmosphere of the Egyptian setting.

263. **The Vision of the School Child,** Francia Baird Crocker, R.N. 8 p. 5 cts. Emphasized the facts that eye hygiene forms an important part of the school health program; and that a knowledge of the visual defects of children is of inestimable value to the teacher in understanding this as a cause of poor class work and of behavior problems.

264. **The Program of Prevention of Blindness as it Relates to Nursing.** 4 p. An outline of services which the National Society for the Prevention of Blindness offers to the nursing profession.

D111. **Teacher Practices and Classroom Conditions Related to the Eye Health of School Children,** Anette M. Phelan, Ph.D. Reprinted from *School Management,* January, 1938. 2 p. $.75 per 100. The author presents a brief discussion on proper hygienic classroom surroundings for eye health.

D112. **Simple Eye Tests in a Pediatrician's Office: Their Value,** Helen M. Johnson, M.D., and William Palmer Lucas, M.D. Reprinted from *California and Western Medicine,* October, 1937. 12 p. 5 cts. After three years' experience in testing vision of children the authors "feel that it is inexcusable for any pediatrician to omit routine eye tests from his physical examination and that *he must* work closely with some very good oculist. . . ."

D113. **Lighting the Schoolroom,** Harry S. Gradle, M.D. Reprinted from *Hygeia,* December, 1937. 4 p. $1.50 per 100. One of a series of articles on illumination.

D114. Light in the Home, Edward Jackson. Reprinted from *Hygeia*, January, 1938. 8 p. 5 cts. One of a series of articles on illumination.

D115. Lighting Standards, Walter B. Lancaster, M.D. Reprinted from *American Journal of Ophthalmology*, December, 1937. 12 p. 10 cts. The author sets forth the grounds on which a valid opinion must be based and gives "references to the experiments and investigations that are fundamental to a sound judgment about lighting in any given case."

D116. Sight Saving Classes Light the Way, Hazel C. McIntire. Reprinted from *Ohio Parent-Teacher*, January, 1938. 2 p. $.75 per 100. A popular discussion of sight-saving classes.

D117. Eyes in Industry, Conrad Berens, M.D. Reprinted from *Hygeia*, February, 1938. 8 p. 5 cts. One of a series of articles on illumination.

Contributors to This Issue

Dr. Ellice M. Alger is a professor of ophthalmology at the New York Post-Graduate Medical School in New York City and a member of the Society's Board of Directors.

Dr. William L. Benedict is chief of the department and professor of ophthalmology, Mayo Foundation, Rochester, Minn.

Dr. Park Lewis, a founder and vice-president of the Society, is well known to the readers of The Sight-Saving Review.

Dr. Charles A. Perera is an instructor in ophthalmology at the College of Physicians and Surgeons, Columbia University, New York City.

As a staff reporter for the *New York Herald Tribune*, **Miss Emma Bugbee** has an established reputation for her human interest stories.

As former associate in nursing activities for the Society, **Mrs. Francia Baird Crocker, R.N.,** has been a frequent contributor to The Sight-Saving Review.

Book reviewers: **Dr. Conrad Berens** is a member of the Society's Board of Directors; **Miss Eleanor W. Mumford** is the Society's associate for nursing activities; **Dr. Miles A. Tinker** is a professor of psychology at the University of Minnesota; **Mr. David Resnick** is publicity director for the Society.

Report of the Committee on Conservation of Vision of the State and Provincial Health Authorities of North America*

A. C. Jost, M.D.

THROUGH a study of the work of state and provincial public health departments in the conservation of vision, it is hoped that a clearer understanding may be attained of the functioning of these agencies in the prevention and control of diseases which may be detrimental to vision

THE following is a brief résumé of developments in conservation of vision activities as they relate to health departments, gathered from the membership of the conference committee appointed for consideration of this phase of health. Further detailed information is in the hands of the committee chairman and can be made available through the National Society for the Prevention of Blindness.

Ophthalmia Neonatorum

In 1906, the first general tabulation of causes of blindness among new admissions to schools for the blind was taken. From then until the year 1933, the percentage of blindness due to ophthalmia neonatorum dropped from 28.2 to 6.7. Since 1933 an upward trend has been noted, and figures for the school year 1935–36 show that 9.1 per cent of the new pupils were admitted because of ophthalmia neonatorum—this in spite of the fact that present laws or health department regulations in all but three of our states require the use of a prophylactic in the eyes of the newborn. It is true that in some states these rulings are so qualified

* Presented at the Conference of the State and Provincial Health Authorities of North America, in Washington, D. C., April 11, 1938.

that they do not cover all cases, and a further fact to be noted is the variance in other provisions, such as furnishing of prophylactic by the health department, securing of medical care, and investigation of cases. In one state ophthalmia neonatorum is not reportable either to state or to local health officers.

Though the rise in percentage as mentioned may, with recent improved regulatory measures, prove only temporary, it still calls attention emphatically to the need for further control measures and to the importance of their enforcement. A periodic check-up on all facts relating to the occurrence of ophthalmia neonatorum would make it possible to determine weak points in procedure and lead to the strengthening of our state programs in this field.

Venereal Diseases and Congenital Syphilis

Present emphasis on venereal disease control and expanding provisions in health departments leading to the examination and treatment of all infected persons are significant from the standpoint of eye health. Though the actual amount of loss of vision due to syphilis is unknown, in some groups studied the proportion blinded from this disease is as high as 15 per cent, and, according to figures of the American Social Hygiene Association, a majority of those born with syphilis find their eyes affected before the age of 30. In view of these facts, the action taken by several health departments encouraging routine blood tests for all expectant mothers is to be particularly commended, as is the promotion of measures to secure health examinations, including blood tests, for persons before marriage.

As further evidence of the part which health departments are taking in venereal disease control, mention may be made of their participation in the educational campaign centering around Social Hygiene Day, in February, and their continued use of informative material furnished by the American Social Hygiene Association and the National Society for the Prevention of Blindness.

Trachoma

It is the recommendation of the Committee that the Conference of State and Provincial Health Officers recognize the importance of the trachoma problem as it exists among Indians. It is true this is

a small indigenous group in comparison with the population as a whole, but more and more the Indians are becoming an actual part of the general population in consequence of their intimate contact with the whites.

Trachoma is not such a problem among the Eastern tribes, but is of serious importance in New Mexico and Arizona, and to some extent in the Dakotas. In the far Western states the tourist travel has developed, and some emphasis is placed on the native Indian as local color; it is in these places that trachoma is seriously prevalent—as high as 30 per cent, for example, among the Navajo tribes of Arizona.

It is recommended that the State and Provincial Health Authorities address the Commissioner of Indian Affairs, advising of their knowledge of conditions and offering any assistance which can adequately be given, in co-operation with the local medical group. Aside from moral support, active assistance may be possible through Social Security appropriations and pensions for blind Indians in co-operation with the government. It is the further recommendation of the committee that the conference recognize the fact that this Indian problem is a matter which should be of interest and concern to the state health officers in whose states the problem is acute, as well as to officials of the federal government who are working along these lines.

It is evident also that the Blind Assistance Programs are indicating that trachoma is an important problem in certain states. In view of the fact that the United States Public Health Service is no longer assuming chief responsibility for the control of trachoma, it would seem advisable for the health and welfare departments in these states to co-operate in developing an adequate plan for case finding and control.

Sight Conservation

It will be recalled that, at its meeting in April, 1937, the Conference of State and Provincial Health Authorities approved a resolution presented by its Committee on Conservation of Vision, calling for the adoption of a plan to promote sight conservation programs under the auspices of state health departments. It was proposed that one or more demonstrations be urged as a means of

showing the value of an approach to this problem through public health channels. The present chairman of this Committee was later appointed to serve with a group of representatives from other national voluntary and federal agencies to act as spokesman for the Conference and to consider possible procedures under the agency of an Interorganization Committee on Sight Conservation.

While recognizing the extent to which measures for prevention of blindness and sight conservation are included in the regular administrative plans of our health departments, it was felt that the focusing of these activities with expansion along certain lines of medical, social and educational service would be advantageous. Since health departments seem a logical channel for such centering of activities, thought was given to the development of an outline suggesting ways in which sight conservation could be developed under health department auspices, which would at the same time utilize and stimulate appropriate activities of other state agencies, thus leading to an inclusive and fully integrated state program.

In September, 1937, the Interorganization Committee sent letters to the executive health officers of 48 states, the District of Columbia, Alaska, and Hawaii, asking for their opinion in regard to this proposition and their suggestions as to practical methods of procedure. The matter was also presented to a representative group of health officials at a dinner given, during the American Public Health Association Conference, by the National Society for the Prevention of Blindness. Replies have been received from 16 states, the District of Columbia, Alaska, and Hawaii. The health officers from 10 states, 1 territory, and the District of Columbia express interest in the proposal and a wish to co-operate with the Interorganization Committee; 1 state and 1 territory express interest but fail to see how further activities can be made financially possible; 3 states are satisfied with present co-operative practices and see no need for a more intensive program; 1 state approves co-operation but sees the activity as principally in the social welfare field; 1 state, though recognizing sight conservation as a health responsibility, indicates that this is being fully met.

It is interesting to note that the majority of health officials who answered appreciate that successful results can be brought about only through co-ordinated efforts of the various state agencies,

though there is some difference of opinion as to where central authority may be most properly placed.

In 31 replies to letters sent simultaneously to state welfare officials, we find similar difference of opinion; practically all see the need for close co-ordination, with responsibilities shared, though 2 believe definitely that the chief obligation is on the health department. In several instances the wish is expressed that closer co-operation between health and welfare departments might be developed.

Certainly replies seem to indicate an awareness of the need for a sight conservation program such as was outlined. It is somewhat disappointing, however, that response from health officers, though in many cases indicating careful consideration and evaluation of present conditions, has not been so strong as to make the Inter-organization Committee feel justified in sponsoring a demonstration as such. A two-day conference held with health, welfare, and educational department executives, in one state wanting to explore the possibilities further, has resulted in the formation of an interdepartmental committee of the three state officials concerned, and the setting down on paper of definite functions falling within the responsibility of each department. As to how far and at what time this may become an actual program, it is impossible to say.

During November and December, 1937, a member of the Inter-organization Committee on Sight Conservation and the regional consultant of the United States Public Health Service took up, with the West Virginia State Department of Health, the question of a study of the trachoma situation in that state. The health department, after considering the possibilities and desirability of such a survey in some of the more isolated counties, and after consultation with various agencies interested in the subject, decided to undertake a study of eye conditions in six of the more rugged counties. It consulted Dr. Alan C. Woods, Director of the Wilmer Institute of Johns Hopkins University, about securing the services of a young ophthalmologist, and received much encouragement concerning this plan.

Dr. Robert A. Hare, of the Wilmer Institute, has been loaned to the West Virginia State Department of Health for three months to make such a survey in six counties. He will be assisted by two

public health nurses and one clerk. The Wilmer Institute has a very commendable interest in this survey. Many deplorable eye conditions in people from West Virginia are treated at the Institute. It is the hope of Dr. Woods that this survey may be instrumental in stimulating that state to do something about its eye problems.

The Interorganization Committee has not wished to lay down a set pattern for adoption or rejection by the states. It has proposed certain general procedures which it considers essential in a constructive and inclusive approach to the prevention of needless visual handicap, but it believes that each state program must be developed in relation to the particular situation and that the impetus and assumption of leadership must come from within the locality. Though perhaps at this time the Interorganization Committee must present a less tangible evidence of sight conservation developments than was anticipated a year ago when the idea of one or more state demonstrations was accepted, there is cause for gratification in an awakening interest among state and local personnel and in a broadening concept of the problem of eye health. With further study and evaluation of conditions and possibilities in the states, it is to be hoped that health departments will take a forward step and assume their full share in meeting this very real need.

The Committee on Conservation of Vision will welcome any suggestions and opportunities for more detailed discussion.

Science Saves Eyesight*

Donald G. Cooley

SCIENCE has made great strides since the days when the "eye doctor" used to prescribe spectacles in hit or miss fashion. By means of intricate scientific instruments minute defects in the shape of the eyeball may be measured and the interior of the eye may be examined for the location of foreign bodies or the symptoms of either visual or systemic diseases

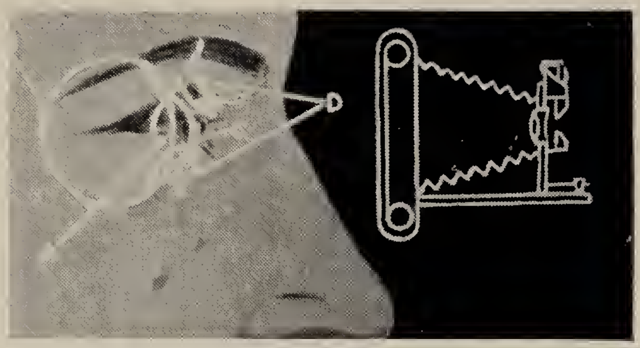
DOES it astonish you to be told that at this very moment, as you read these words, you are totally blind for a considerable part of the time it takes you to scan this sentence?

Science has proved that the human eye can see nothing while it is in motion. You read this line of type in four or five jumps, pausing at stopping-points to absorb a word or two, then passing on. As the eye moves from one fixation point to another you are quite blind, although you do not realize it because of the phenomenon of persistence of vision—the fortunate provision of nature which makes the movies possible.

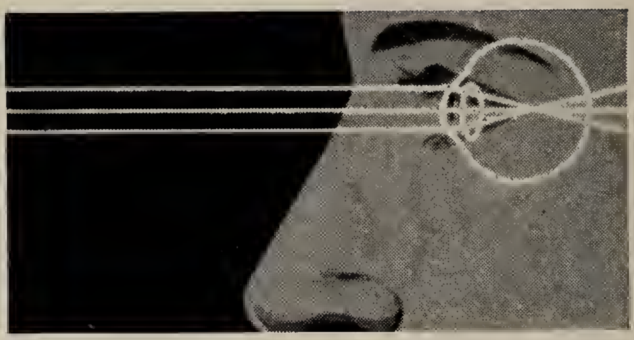
For that matter, man is the only animal with an eye capable of reading or other close work. And there is only one tiny spot in the eye, called the macula, which can see things sharply. When you look at an object which you must see distinctly, you focus its light rays upon the macula. You can demonstrate this for yourself by focusing your vision on a word in the center of this line. It is clear and sharp. But the words on either side fade out to an indistinguishable gray blur.

The eye is such a complex precision instrument that in the entire human race there is probably no such thing as a physiologically perfect eye. Most eye defects are errors of refraction—some ele-

* Reprinted, with permission, from *Modern Mechanix*, January, 1938. Photographs by courtesy of Bausch and Lomb Optical Company.



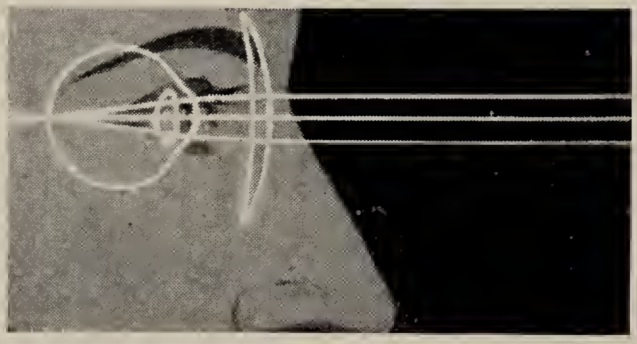
Like a camera the eye has its (a) lens; (b) film, the retina; (c) diaphragm; and (d) shutter, the eyelid. The eye focuses by changing the shape of its lens.



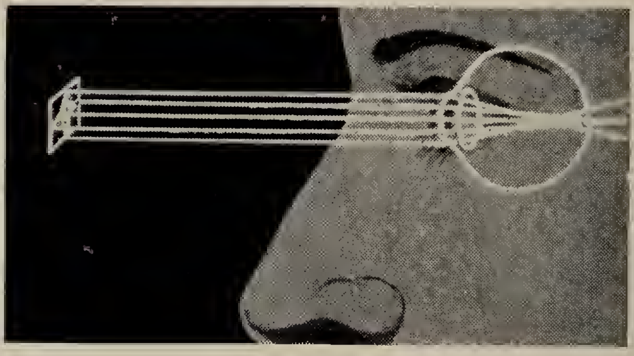
If the eyeball is too long, or if the cornea is too strongly curved, images of distant objects are brought to focus in front of the retina.

When the eyeball is too short, or the front of the eye (the cornea) is not sufficiently curved, rays of light come to a focus behind the retina.

Nearsightedness is corrected by a concave lens, which bends the light rays and brings them to a focus on the retina.



To correct farsightedness, a convex spectacle lens is worn before the farsighted eye to bring the light rays to a sharp focus on the retina.



Astigmatism, the inability of the eye to see both horizontal and vertical lines with equal sharpness at the same time, is corrected by a cylindrical or toric lens.

ment of the eye is imperfectly shaped so that the organ cannot refract, or bend, the rays of light to focus them exactly on the retina. Years ago the old-time "eye doctor" used to prescribe spectacles in hit or miss fashion by allowing his patient to try on various lenses from his sample case. When the customer found a lens which seemed to help him see better, the transaction was completed without any further tests. This "trial and error" method is part of the ancient history of the science of refraction. Today the refractionist uses delicate measuring devices which are among the most sensitive precision instruments known to any branch of science.

One such instrument, called Green's refractor, is a complete optical miracle in itself. It is a complex instrument of dials, lenses and knobs which almost completely obscures the patient's face as he peers through it. To the uninitiated it looks like a monstrous mechanical mask suggestive of a Rube Goldberg invention. But this single mechanism is capable of making every examination required in refractive procedures.

To understand this major miracle, some comprehension of the most common refractive errors of the eye is necessary. Your own eye is practically certain to be nearsighted, farsighted, or astigmatic, although very possibly to such a slight degree that no optical correction is necessary. Nearsightedness is generally the result of an eyeball which is too long: the lens focuses light rays in front of the retina instead of upon it. It is corrected by concave lenses. In farsightedness, the eyeball is too short and rays are focused behind the retina. The condition is corrected by convex lenses. Astigmatism results when the cornea—the transparent window at the very front of the eye—is curved unequally like the bulge of a teaspoon, instead of a mathematically correct spherical bulge. Compound lenses with unlike curves in different meridians compensate for this anomaly.

Sounds pretty complicated, doesn't it? Especially when you consider that two or more refractive deviations are usually found in the same eye. If you operate a camera, you know how critical a matter it is to focus your subject sharply. The slightest miscalculation gives a fuzzy negative. It's the same with the eye, except that spectacle lenses must be figured with infinitely greater precision. Many of the lenses used in refractive instruments are

The Ferree-Rand perimeter charts the field of vision. One eye is tested at a time, a mask covering the other. While the patient fixes her vision on a fixation point, the doctor moves a test card along the semicircular frame until it becomes visible to the patient, the point of visibility marking one limit of the visual field.

The slit-lamp, or biomicroscope, enables a surgeon to determine just how deeply a foreign object, like a cinder, lies in the structure of the eye.

ground to an accuracy of a fraction of a wavelength of light—and if men were as wide as a wavelength of light, 3,000,000 of them could stand side by side on the edge of a foot rule.

Astigmatism produces more discomfort than any other refractive shortcomings of the eye. If you are astigmatic, you are unable to see horizontal and vertical lines with equal sharpness at the same time. If the vertical mesh of a screen door is distinct, the horizontal lines are hazy. It used to be thought that the cause of astigmatism was a displacement or tilt of the crystalline lens of the eye. Now it is known that the general cause of astigmatism is a malformation of the cornea.

To measure the cornea curvature, the refractionist uses an instrument called the keratometer or ophthalmometer. It consists essentially of a target which is imaged on the cornea, and a telescope through which the examiner observes the image. The patient looks through an aperture in the center of the target and fixes his vision on an image of his own eye. Light is projected from the target to the patient's cornea; from there the light rays pass through a series of lenses to form a magnified image which the examiner measures. Readings on the dials of the ophthalmometer give the proper figures for the corrective lens needed by the patient.

Astigmatism is also measured subjectively by having the patient look at charts until a corrective lens is found which makes both the horizontal and vertical lines on the test card appear equally sharp.

A trial frame, which is a spectacle frame in which test lenses can be placed and removed quickly, is also used in testing astigmatism, as well as nearsightedness and farsightedness. In Green's refractor, mentioned above, trial lenses are not used. The operator obtains lens powers of different combinations by manipulating the proper dials of the instrument, and when he is through he simply reads the correct prescription from the engraved figures which appear in windows alongside the dials.

If an additional check on lens power is desired, the examiner may usher you to a seat alongside his Ferree-Rand projector. This instrument, which is something like a specialized magic lantern, projects the symbols of a test chart on a screen. If you have ever stood in a thick forest at nightfall, you know how darkness creeps up until you are finally unable to see anything at all. The point

where you are just able to distinguish detail, before darkness blots everything out, is your threshold of vision. The eye is most sensitive to changes when working at this threshold.

Taking advantage of this principle, the operator of the projector dims the machine until you can just distinguish the test characters on the screen. Then, with his test lenses, he will strengthen or

An important aid in the diagnosis of brain tumor, kidney disease, anemia and various blood diseases, this instrument, the binocular ophthalmoscope, shows the eye background in stereoscopic depth, magnified 16 times.

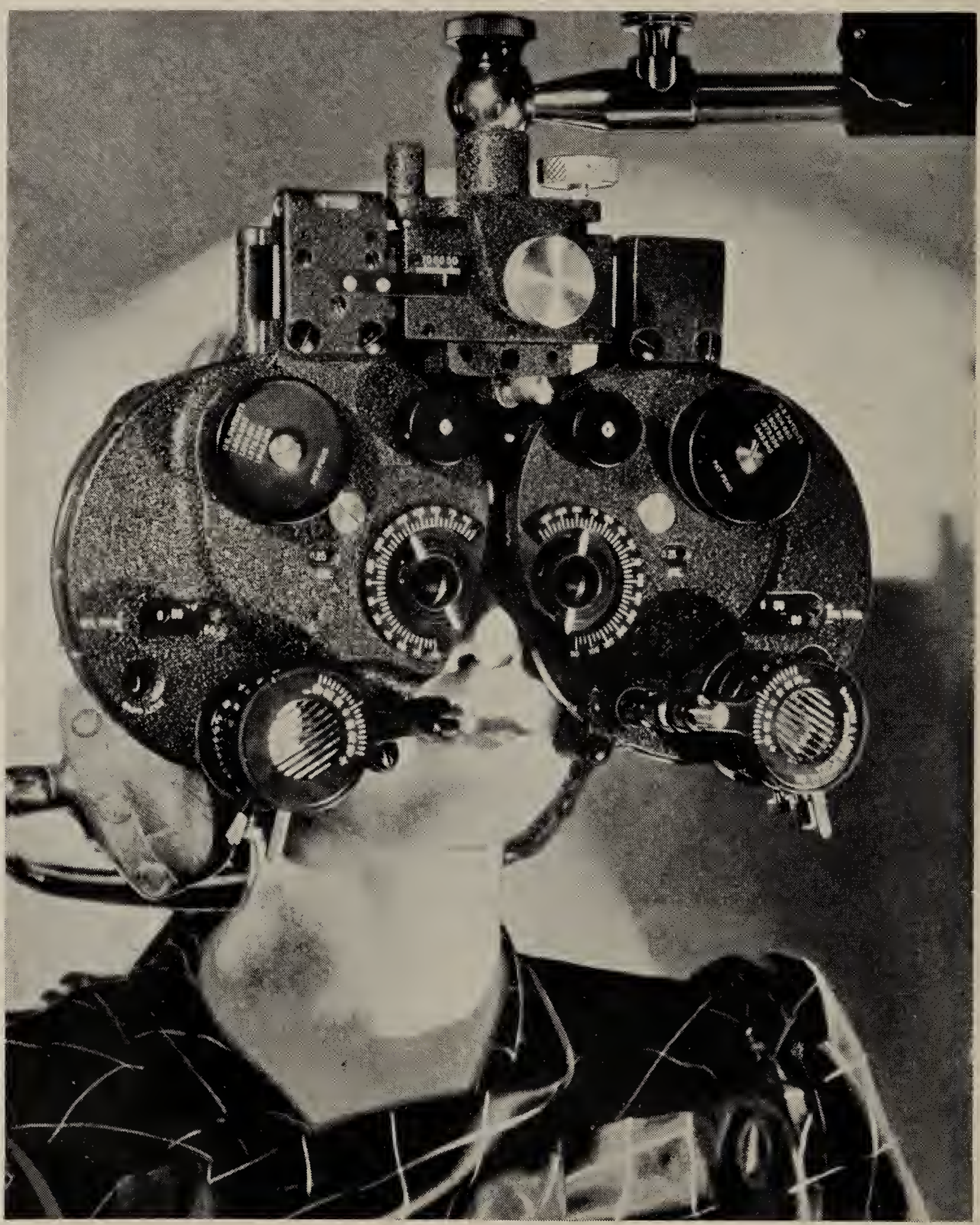
weaken your spectacle prescription very slightly. This tiny change in lens power will either improve your visual acuity considerably, or blur out detail entirely, thus enabling him to choose the proper lens for your eyes with extreme accuracy.

An instrument which the refractionist may use instead of the usual test cards hanging on a wall is the Clason acuity meter. This projects the familiar test symbols on a screen, varying their size rather than the strength of illumination. A sliding lever enables

the operator to enlarge the symbols on the screen from invisibility to any desired size. The patient cannot memorize the symbols and give misleading answers, as sometimes happens when charts are used, for the examiner begins with symbols too small to be distinguished, and stops enlarging them at the exact point where the patient can read them.

By means of the ophthalmoscope, which illuminates the eye by a beam of light, doctors are able to study the interior of the living eye. The condition of the retina of the eye is an index to many types of disease.

The invention of the ophthalmoscope by Helmholtz in 1851 really marked the beginning of the science of physiological optics. Students had always wanted to see into the interior of the living eye, but this was generally believed to be impossible as it was thought that all light shining into the eye was completely absorbed. The ophthalmoscope of Helmholtz proved that when a beam of light is



Green's refractor is a marvelously intricate optical instrument, which is capable of measuring all refractive errors of the human eye. It is one of science's most valuable tools for saving eyesight.

projected into the eye, the deeper parts can be made visible if the examiner looks along the line of the beam.

Essentially, the ophthalmoscope is a hand instrument which generates light from a bulb in the handle and projects it from a mirror into the eye, the examiner peering through a pinhole behind the center of the mirror. To him the pupil then appears red instead of black; what he sees is the retina or background of the eye, with its network of nerves and blood vessels. The eye background is technically called the fundus and it looks like an orange disc, with red blood vessels. The retina is perhaps the most marvelous sense organ of the body. It is the light-sensitive curtain at the back of the eye which transmits images formed upon it to the brain via the optic nerve. Thinner than a sheet of onionskin, microphotographs reveal that the retina consists of ten layers. The deepest layer is made up of rods and cones (so named from their appearance) which in some mysterious way seem responsible for the chemistry of vision. In each eye there are some 130,000,000 rods and cones—one for each man, woman, and child in the United States.

Actually the retina is an extension of brain tissue. It is, in fact, the only spot in the body where the living brain may be observed. This fact makes it of vital importance in diagnosing many other diseases than those of the eye. A brain tumor, for instance, often betrays its presence through the condition of veins and arteries of the retina. Kidney disease, anemia, certain stages of diabetes and many other diseases leave important symptoms in the retina. Such is the vital organ whose examination the ophthalmoscope made possible.

In the past two decades the binocular ophthalmoscope has partially replaced the older hand type. The retina area can be observed in three dimensions by the binocular instrument, which does not differ in fundamental principle. Instead of a flat view of the fundus, the binocular instrument obtains a picture with depth, magnified some 16 times, enabling the topography of the retina to be studied.

Similar in appearance to the hand ophthalmoscope is the retinoscope, a device which enables refractive lenses to be prescribed without the co-operation of the patient. It is often used in prescribing lenses for children or for illiterates who cannot read the alphabet

on test cards. Babies as young as ten months have been fitted accurately with glasses—so accurately that the infants cry for them if mother neglects to put them on.

Optical principles on which the retinoscope is based are extremely complicated, but in practice the examiner determines the strength of corrective lens which is needed by throwing a narrow beam of light into the eye from the retinoscope and observing the direction of movement of the light spot and its accompanying shadows as the light beam is moved across the eye.

Your eye has several fields of vision, one for each primary color. Certain nerves are sensitive to blue, red, and green light respectively. Out of these three primaries all sensations of color are derived. All three primaries in combination give white; their total absence, black; and yellow and purple and other hues are merely combinations of the primaries in varying proportions. This fact is the basis of all systems of color photography.

"Visual fields" do not refer to depth of vision, or acuity, but to absolute area. If your eye is average, the widest color field is for blue, then red, with green the smallest. In certain eye diseases, such as glaucoma, the visual fields are important guides to diagnosis. One instrument for measuring these fields is the Ferree-Rand perimeter. The patient sits with his face on a chin rest, one eye masked, and focuses on a fixation point while the examiner moves a test object along a semi-circular frame. The point at which the object can be distinguished as to color marks one boundary of the visual field for that hue.

Another instrument serving a similar purpose is the Stereo-Campimeter. In this device the patient looks through binocular lenses at a stage, upon which test objects are manipulated to chart the fields. By the substitution of twin photographs, exactly like those used in the old parlor stereoscope, patients with squints or improperly co-operating eye muscles are aided to overcome their trouble. This is called fusion training. In squints, one eye usually does most of the work. The binocular design of the Stereo-Campimeter forces both eyes to work together and muscles are trained to proper functioning.

One of the most extraordinary instruments used by eye physicians is the slit-lamp. In effect, this marvelous machine uses a thin

beam of light to slice out a section of the eye and place it upon a microscope slide for thorough examination, just as a surgeon would perform the operation with a knife. Actually it is purely an optical phenomenon.

If a cinder becomes imbedded in your eye, or if you have a beginning cataract in the crystalline lens of your eye, the slit-lamp enables the physician to determine the exact depth at which the lesion exists. The instrument consists of a powerful light source which throws a narrow beam of light to the desired layer of the eye, and this is examined from an oblique angle with a binocular microscope. With magnifications up to 50 times, the cornea, as an example, appears stereoscopically to have a depth of approximately half an inch and the depth of objects or natural structures can easily be determined.

1937 Survey of Fireworks Accidents in Maryland*

THE number of personal injuries caused by fireworks during the period of a week before and a week after July 4, 1937, in Maryland was 154 per cent greater than the number reported for the same period in 1935. To remedy this situation the Maryland Society for the Prevention of Blindness recommends adequate legislation and safety education

Object

The object of the survey was to secure accurate and complete statistical information with respect to personal injuries caused by the promiscuous sale and use of fireworks in Maryland during the period of a week before and a week after the Fourth of July, 1937.

Method

The survey was the most accurate and comprehensive of its kind ever conducted in Maryland, and was made possible by the co-operation of the state and city health departments, the state and city police departments, the city fire department and of every hospital and physician, and of many newspapers in the state. Well in advance of the Fourth, accident report forms prepared by the Maryland Society were distributed by the Society to 799 physicians outside Balt`more, to the county health agents of 23 counties and to the 43 hospitals in the state. Through the Baltimore Police Department and the state police department such report forms were distributed to the city police and to each of the state police substations. Through the Baltimore City Health Department, such accident report forms were distributed by the commissioner

* Report submitted by Francis F. Symington, Chairman, Fireworks Accident Committee, Maryland Society for the Prevention of Blindness.

of health to each of the 1,200 physicians in Baltimore. All were urged to report every accident caused by the use of fireworks which came to their attention during the week before and the week after the Fourth. The Maryland Society also clipped newspaper reports of fireworks accidents in the state for the same period.

Statistics

It appears from the reports received that there were 295 persons who suffered personal injuries of sufficient seriousness to require medical attention as a result of fireworks accidents in Maryland during the period indicated. One child was killed in Baltimore City. Of the total number of cases in the state, 207 occurred in Baltimore City, and 88 in the state outside of Baltimore City.

Age.—Various breakdowns and classifications of the statistics with respect to the total number of cases follow:

Age	*City*	*County*	*Total*
Under 1 year	1	0	1
One year to 5	5	5	10
6 to 10	54	26	80
11 to 15	101	25	126
16 to 20	19	9	28
21 to 30	18	7	25
31 to 40	3	7	10
41 to 50	1	4	5
51 to 60	2	0	2
Age not reported	3	5	8

217 persons injured were under 15 years of age.
78 persons injured were over 15 years of age.

Color.—Of the 295 injured, 283 persons were white and 12 were colored.

Sex.—There were 249 males and 46 females injured.

Types of Fireworks Causing Injury.—The types of fireworks are enumerated below:

Type of Fireworks	*City*	*County*	*Total*
Sky-rockets	2	5	7
Roman candles	2	6	8
Sparklers	2	1	3
Torpedoes	4	6	10
Ordinary firecrackers	180	67	247
Miscellaneous types	17	3	20

Parts of Body Injured.—Of the total number, 38 persons suffered face injuries; 8 had neck injuries; 20 suffered injuries to eyes; 181, to hands or arms; 25, to feet or legs; and 23 persons suffered injuries to other parts of body.

Particular Use of Fireworks.—Firecrackers exploding in bottles caused injuries to 5 persons; and 11 persons were hurt by firecrackers exploding in tin cans.

Outstanding Accidents

The following are a few examples of the types of accidents (identification purposely not disclosed):

Child—age 8.—Baltimore City. While lighting a sparkler in the rear yard, dress caught fire from the match. First and second degree burns on body and arms. Taken to Baltimore City Hospital, where she died at 4 A.M., July 5, 1937.

Young man—age 24.—Baltimore City. Sky-rocket exploded in hand. First and second degree burns of back of four fingers of right hand. Taken to Baltimore City Hospital.

Child—age 10.—Baltimore City. Tin can placed over large firecracker by 12-year-old boy. Struck child 45 feet from place where it was set off. Lacerated mouth. Twenty-five stitches required. Treated at West Baltimore General Hospital.

Young woman—age 20.—Baltimore City. Struck over left eyebrow by tin can hurled by an exploding firecracker. Irregular laceration two inches long over left eyebrow. Treated at Baltimore City Hospital.

Child—age 12.—Baltimore County. Placed a firecracker in small bottle. Bottle broke into small pieces and struck him in eye. Sent to Johns Hopkins Hospital, where they operated on his eye.

Child—age 12.—Baltimore County. Injury to forehead and eye from firecracker exploding in tin can. Deep laceration above eye. Treated by physician.

Child—age 13.—Caroline County. Placed a three-inch firecracker under tin can. Throat cut by flying tin. Required 27 stitches. Hospital.

Young man—age 23.—Cecil County. Riding in automobile when he took firecracker from pocket and lighted it by mistake for cigarette. Abrasion of upper and lower lip. Hospital.

Child—age 9.—Charles County. Explosion of Roman candle. Burn of cheek and contusion of upper left eyelid. Treated by physician.

Child—age 8.—Frederick County. Second degree burn of face and left hand. Eyebrows and lashes singed off. Corneas milky. Treated by physician.

Child—age 10.—Montgomery County. Firecracker exploded in hand. Laceration of cornea of left eye with hemorrhage into anterior chamber. Hospital.

Young woman—age 29.—Washington County. Torpedo exploded and part went into left eye. Burn of left eye and hemorrhage in vitreous cavity. Washington County Hospital.

Conclusion

The survey supports contentions which have long been made by the National Safety Council, the American Museum of Safety, the National Society for the Prevention of Blindness, the Maryland Society for the Prevention of Blindness, and all those who have made any study of fireworks accidents, namely, that *all fireworks are dangerous*, because the promiscuous use of them involves the indiscreet use of *two dangerous elements: fire* and *powder.* Furthermore, the survey supports the contention of the Maryland Society that fireworks do far more harm in Maryland than is realized by citizens and public authorities, particularly those responsible for the safety and physical well-being of the children of this state. It supports the contention of the Maryland Society that there should be a state-wide law in Maryland, as there is in many other states, which, while permitting displays conducted by properly qualified public authorities and private organizations, prohibits the promiscuous sale and use of fireworks.

In 1935 a bill to remedy this situation was introduced in the general assembly and was actively sponsored by the Maryland Society with the co-operation of numerous other public authorities and private organizations which were awake to the need for such an act. The bill was killed. At that time representatives of the Maryland Society warned the legislators and the public authorities that without some such legislation there would be an alarming increase in the inexcusable personal injuries, particularly to children,

resulting from the widespread sale and use of fireworks in Maryland. In order to back up this warning, the Society thereupon determined to get at the facts.

In 1935 it conducted a survey of fireworks accidents in the state outside of Baltimore during the period of a week before and a week after the Fourth. From this survey it appeared that during that period over 100 persons sustained personal injuries and 3 persons were killed. (These figures do not include 3 other persons killed and 22 other persons injured during the month of June, 1935, as a result of explosions in fireworks factories in Harford County.) According to the records of the Baltimore Safety Council, 16 persons were injured in Baltimore City during the same period.

Because of lack of funds the Society was unable to conduct a survey in 1936. From a compilation of various unorganized reports, however, it appeared that the total number of persons injured in the state outside of Baltimore for that year remained about the same and that there was a 100 per cent increase in Baltimore City.

The 1937 survey covered the entire state and indicated that one child was killed and a total of 295 persons sustained personal injuries in the state during the two-week period before and after July 4, 1937—88 of these casualties occurred in the counties and 207 in Baltimore City.

It appears, therefore, that since 1935, when the state-wide bill prepared and sponsored by the Maryland Society was defeated, there has been an alarming increase in the total number of persons injured by fireworks in Maryland. The total for 1937 was 154 per cent greater than that reported in 1935. During the same period there has been an even more alarming increase in the number of persons so injured in Baltimore City, the number in 1937 being over ten times as great as the number reported in 1935. In short, the facts have shown that the Maryland Society was tragically right in the warning which it gave in 1935.

Will state-wide legislation help this situation? The Maryland Society is convinced that it will and that it is the only thing that will. It has helped in other states. A most striking example is to be found in the State of New Jersey, which, in 1936, passed an act somewhat similar to the one defeated in the Maryland Legislature in 1935. Through this legislative action, New Jersey reduced

the number of Fourth of July fireworks accidents from 927 in 1936 to 72 in 1937—a 92 per cent reduction.

The Maryland Society realizes that adequate legislation alone is not enough. There must be education, for in the long run no law can be more effective than the sanction behind it. On the other hand, no public opinion however educated and no sanction however strong can operate effectively without some sound means of control. Therein lies the need for proper legislation.

New Trends in Sight-Saving Class Activities

Winifred Hathaway

THE philosophy underlying sight-saving class teaching has made much progress since the early years of special education. Through study of the physiology and pathology of the eye; through intelligent use of illumination and auditory aids; and through an understanding of vocational possibilities, the modern sight-saving class teacher is able to train her pupils to play a useful rôle in the world's work

REAL progress is usually a growth rather than a sudden development. It took a very long time for elementary school education to progress beyond the idea that the three R's constituted a school program. Not, indeed, until the system was well advanced did the educational authorities decide to let down the bars to give cultural subjects a place in the curriculum.

Time was when it was looked upon as a misdemeanor for a child to talk in school, and not long ago the activity program was not admitted to be a possibility. Special education was such a latecomer into the educational field that it is small wonder that in its early years it should have been bounded by the same concept of limitations.

Early Limitations in Sight-Saving Class Work

In the early years of special education, particularly in sight-saving classes, the lack of precedent made the trial and error method the only one possible. At that time educators knew and, indeed, were expected to know, very little about the process of seeing. Procedures were dominated by the fear that something might be done educationally that would further harm already damaged eyes. Mute witness was the insignia over the doorway of the first myope

school opened in London, "Reading and Writing Shall Not Enter Here."

For a considerable part of the time covering the history of sight-saving classes, the emphasis was definitely placed on limitations and prohibitions rather than upon expansions of opportunities. Psychological reactions caused by inhibitions were given less attention than the possibility of actual harm to the eyes. Efforts were centered more on defending and protecting the weakness of the individual than upon developing his strength.

The White House Conference Report of 1930 called very definite attention to this discrepancy in all lines of special education, and gradually a new attitude has come into being—that of emphasizing possibilities and of opening up broader fields of opportunity. Naturally, in the new trends, the fact that the handicapping disabilities must be given all necessary care is never lost sight of.

Medical and Optical Advances

But emphasis is now being placed on expansion. In order to make this possible, the modern sight-saving class teacher has the very definite objective of keeping abreast of advances in medical science and in education. Both are a constant challenge.

Detachment of the Retina.—Even as late as ten years ago, a detached retina was thought to have but one result—blindness. Today, the sight of innumerable eyes is being saved by a new diathermic procedure of operation. The important point is that the earlier the discovery is made and the treatment instituted, the greater is the hope of accomplishing the desired results. Every sight-saving class teacher knows that although detachment of the retina may be the result of any one of a number of causes, it is more frequently associated with high myopia than with any other single defect; hence she gives special attention to the activities of the high, progressive myope.

But something more than this is necessary. Is the sight-saving class teacher on the lookout for any sudden diminution of vision in myopes or in others? Does she act as a source of information in the community to spread the knowledge that any sudden diminution of vision requires immediate attention? Surely the sight-saving class teacher who has kept abreast of scientific medical advances must

assume the responsibility of becoming a teacher in a much wider sense than that of teaching the group immediately under her care. First, she must learn, and then she must reach out into the community with this new knowledge.

Corneal Transplantation.—Again, although much research work has, in the past, been done on the possibility of transplanting corneas, only very recently have techniques been developed for transferring the clear cornea of a human eye to replace the scarred cornea of another. Clear corneas are being obtained from eyes that are otherwise useless and have to be enucleated as a result of accident, brain tumor or other cause. It has been discovered that the cornea from the eye of a fetus may, in some cases, be used. The sight-saving class teacher must be most conservative in making a statement regarding this new development, but every teacher should have in mind the possibility of such operation in those cases of corneal scars in which the rest of the eye functions. How marvelous if some of these low-visioned children at present in sight-saving classes could actually, like the story of the Arabian Nights, have new lamps substituted for old!

Gonorrheal and Syphilitic Eye Involvements.—There is another advance in medical science that may be more far-reaching. Researches indicate promising possibilities for curing gonorrhea, a cause of much blindness and impairment of vision. A short time ago, Dr. Thomas Parran, now Surgeon General of the United States, was not permitted to broadcast a talk on syphilis. The word was tabooed by radio and by the press. Medical journals were presenting articles on this subject, but how could such articles, even had they been written in non-technical language, reach the layman? Dr. Parran, realizing that most harmful germs thrive in the dark, answered that the only way to overcome this germ that was so disastrously affecting humanity, was to bring it out into the light, and he thought the radio was the most effective method.

But when he was cut off so summarily, another way opened. *Reader's Digest* published the article. Reprints were made available and were distributed far and wide by health and educational authorities and by civic organizations. The response to this article was a demand for a second, and hearing the voice of the public, the radio authorities rescinded their ultimatum.

The general subject is being widely discussed and emphasis is now being placed on prenatal care, for it is during the prenatal period that the germ works most insidiously. If all forces work together to stamp out syphilis, it is not impossible that there will no longer be found in sight-saving classes or in clinics children with interstitial keratitis, optic atrophy, iritis, cyclitis and various other eye difficulties that so often are the result of this disease.

Contact Lenses.—Along other lines of scientific advance with which the sight-saving class teacher must be familiar is the contact lens. Although this type of lens has been known for some time, only rather recently has it been made of practical use. Contact lenses are of particular value in cases of conical cornea and in some cases of myopia. The ophthalmologist is, naturally, the one to decide whether they will be of value in particular instances, but unless information is given as to the existence of such possibility, the ophthalmologist may wait in vain to be of assistance.

Telescopic Lenses.—Telescopic lenses have a similar history and here, again, it is the function of the sight-saving class teacher to act as a medium of information between the layman and the physician.

Advances in Lighting

Educational trends are no less worthy of consideration. All along the line there is a broadening of concepts. Among those that vitally affect people with eye difficulties is the recognition that correct lighting, natural and artificial, is essential for accuracy, ease and speed of seeing. It is now known that the astigmatic eye requires considerably more light than does the normal eye, and that increased illumination of the correct type may act as a compensation so that less human energy is required to bring about desired results in the process of seeing.

Artificial Illumination.—Illumination is being given a very important place in the educational world of today and, as is so often the case, the sight-saving classroom is being used as a demonstration for the rest of the school. It is, therefore, essential that the sight-saving class teacher acquaint herself with the advances along this line. Even when an expert in illumination is called in, the sight-saving class teacher is the authority on the educational side

of the work, and with her knowledge of the eye conditions of her pupils, she should be able to make a check-up on the plans.

A lighting company offered to install artificial illumination in a sight-saving class of a large city as a demonstration. Time and energy were expended and no expense was spared. But in his zeal to have everything as fine as possible, the engineer selected a luminaire with a decorative design in glass around the edges of the totally indirect unit. This, catching the light, made a distressing halo around each unit and the school system refused to have further installations made.

Uses and Abuses of Photoelectric Cell Control.—One of the scientific advances in illumination with which the sight-saving class teacher should be familiar is the photoelectric cell control. But she should know much more than just the fact that such a method of control exists. In one place where a photoelectric cell was installed, the sky is often obscured for brief moments by passing clouds: this caused a most distressing flashing on and off of the artificial illumination. In another classroom, the photoelectric cell would not work properly unless the upper part of the windows was painted. Every student of illumination knows that the best natural lighting for pupils on the far side of the room comes from the top of the windows. Yet, in order to permit the photoelectric cell to work, that aspect was entirely ignored. How much more desirable to have the natural illumination from the top of the windows and to switch on the artificial illumination when needed, than to install a photoelectric cell requiring this source of natural light to be cut off! As a result of painting the upper part of the windows, the artificial illumination had to be kept on all day, such a needless waste of power and money that the school system refused to consider the relighting of other rooms.

In still another instance, it was thought to be economical to install one photoelectric cell to control all the rooms on different floors of a building that had the same exposure throughout. Other things being equal, rooms on upper floors are likely to have higher intensities than those on lower floors. By this one-control system, when the natural illumination fell below the required minimum on the ground floor, the lights went on in all the corresponding rooms in the building. When it was necessary to draw the shades in some

rooms to shut out the glare or to permit the use of slides, the artificial illumination came on in all rooms similarly situated. Here, again, the expense entailed lessened the possibility of having good artificial illumination in all the schools of the system.

Fortunately, many improvements have been made in the photoelectric cell. The new types prevent the uncomfortable flashing on and off of light; the change is a gradual one. The cost of installation is much lower than formerly.

Although the desire in sight-saving class work has been to do as little intensive eye work as possible for the carrying out of the educational program, the great majority of sight-saving class teachers must confess to "culpa mea." So much emphasis has been placed upon meeting the academic requirements that partially-seeing pupils, as well as those with normal vision, are required to carry altogether too heavy an eye load.

Auditory Aids in Education

One of the present trends in education which is particularly applicable to the sight-saving class pupil is the placing of emphasis more and more on the sense of hearing, and less on the sense of sight. To become a good listener requires concentration, one of the fundamentals upon which education is built. Mechanical devices are doing much to bring this about. Among these, the radio takes first place.

The Radio.—The Damrosch concerts on the radio have opened up for school people a possibility of musical appreciation undreamed of until very recent times. At the time of the California earthquake when so many schools were either wrecked or made uninhabitable, some school work was done by radio, centers being opened in tents for the use of children who had no receiving sets at home. During an epidemic of infantile paralysis in a large city, which necessitated closing the schools, even more was accomplished over the radio than had been possible at the earlier period of the earthquake in California. Neither of these experiments was wholly satisfactory, but each was a step in the right direction.

The vista widens. For the Damrosch concerts the time is arranged far in advance of the actual program, hence school systems adapt their time schedules accordingly. Proposals are now being

made for reserving the use of certain wave lengths exclusively for educational purposes, actual programs of instruction to be prepared with the times arranged sufficiently in advance, as in the Damrosch programs, so that full use may be made of the opportunities offered. This plan will, of course, necessitate co-operative effort but the possibilities are almost unlimited.

The Talking Book.—Another device, although somewhat more limited in scope, is the Talking Book. New appropriations from Congress are making possible large increases in the number of records, and the fact that most of the machines on which these records are used are also radios will make them of double value. In one particular, the Talking Book has an advantage over the radio. If a pupil wishes a part of the reading repeated, or if he was absent at the time the selection was given, the record can be put on again and a pair of earphones used so that he can listen without disturbing the other pupils.

One of the aims of the sight-saving class has been to have the partially-seeing child as much a part of the regular school system as possible, by participating in the regular grade work. The use of the radio and the Talking Book will definitely help solve the problems connected with this co-operative effort. If, for instance, a reading assignment is given to the class in English, all the members can listen to the reading in a group. Surely this is a very great improvement over the present method by which each pupil in the regular grade reads assignments for himself (thus adding to the burden on his eyes), and the sight-saving class pupil returns to his special room, there to have the assignment read to him by the sight-saving class teacher or by a student reader. By the newer method, the energy and attention of the teacher can be released for more creative work. In this way, also, will be overcome some of the difficulties now arising from the paucity of books in large type, and the ideal of the sight-saving class of eliminating unnecessary eye use will be much nearer realization.

Advances in Vocational Guidance

Perhaps the greatest change noticeable in consideration of sight-saving class problems is in the new attitude toward possible employment. It is stated that the invention of a machine deprives

many people of work, but the fact is often lost sight of that new machines create new possibilities of work. The auto, looked at so askance in its early development, has made work possible for countless thousands, not only in the production of the vehicle itself, but in its accessory necessities: gas, oil, etc., all, in turn, requiring the facilities of transportation, service station, salesmanship and an ever-increasing variety of employment.

All these trends have a definite relationship to the question the sight-saving class teacher is asking herself, and which other persons, including her pupils, are asking her. How are partially-seeing pupils to earn a living without further endangering their sight? First, the questions the teacher must ask herself: What are the various types of occupation offered in the community? Which of them can be undertaken by partially-seeing people? How are these people to receive training for such occupations? And most important question of all: What does the pupil, himself, want to do? If he has a special desire and there is no possible way of satisfying this, must not the psychological result that may arise from frustration of his desire be given equal consideration with that of the possibility of increasing his eye difficulty? Is is, perhaps, in this particular, that education of handicapped people has erred most—fearing so much the possible effect on the eyes as to preclude altogether the effect on the personality.

The special class teacher is, of course, greatly concerned about the future opportunities for all her pupils, but there are always those who, even were they unhandicapped, would drift into factory work or other unskilled labor; for such some type of employment can usually be found. It is the future of the pupils with higher I. Q's that forms the problem, and the special class teacher may find a possible solution in some of the newer occupations.

Newer Occupations.—For example, radio has opened up opportunities that may accentuate the strength and minimize the weakness of the handicap. There is on one program a young chap who has outstanding dramatic ability and a fine, resonant, sympathetic voice. He is a hunchback and so deformed that the stage and the silver screen are closed to him. But he delights his radio audience with his fine performances. Others, handicapped as he is, might make most acceptable announcers for radio programs. A girl with

very serious eye difficulty is using her ability to prepare radio and screen continuity programs.

Making the Most of Natural Aptitudes.—Cannot that great gift, a sense of humor, be developed in some of the handicapped so that they may bring to radio audiences the joy and relaxation of laughter? If Will Rogers or Marie Dressler had been totally blind, either could still have given to humanity the merriment that is one of the most potent cosmetics the world will ever have.

It would be interesting to know just how many actors or actresses, either of the stage or the screen, are wearing contact lenses who would, in all probability, have been prevented from using their talents if this advance in science had not made possible for them such mechanical aid.

There are two things necessary in this question of employment: first, to widen the horizon of possibilities by a thorough study of opportunities, of personal fitness, mental and physical; next, to make the junior and senior high schools effective training centers, because the first question asked of any applicant in the present day is, "Are you trained for this job?" It is a big order, for it means training courses along motor, as well as along academic, lines. It means finding out the possibilities for the handicapped, testing their capacities for doing what they desire, and making training available. But it means more than that, since the great majority of girls and boys entering junior and even senior high schools have no definite lead as to future occupations. One solution of this is to extend the work now being very effectively carried out in a few junior and senior high schools. This is a program of pre-vocational training in which opportunity is provided to take preliminary work in a number of occupations in order that the pupil and the instructor, together, may determine a wise course of procedure.

The Minneapolis Plan.—The experiment being carried on in Minneapolis, Minnesota, commends itself for consideration in other places. Briefly, this is a plan of co-operation between the Minneapolis City School Board and the State Department of Vocational Rehabilitation. It grew out of certain findings that pupils with poor vision usually finish high school with little or no vocational training, yet most of them do not go to college. In general, the employer's attitude toward them was found to be decidedly

negative. It was decided, therefore, to give them the opportunity to prove themselves employable by setting up a project of part time work and part time employment for all definitely not going to college, since the best place to begin the vocational rehabilitation is in the school itself.

The experiment began with two girls and three boys. Credit for outside employment was granted by the educational authorities and the rehabilitation department agreed to pay employers for the training at the rate of 50 cents an afternoon, provided the employers paid a like amount to the trainee. A typical program was worked out in which the pupils carried three school subjects from 8:30 to 1:00 o'clock and did actual work under the guidance of selected employers from 2:00 to 5:00 o'clock. The vocational advisement is determined by the public school Child Guidance Clinic and is followed by conferences with the psychiatrist, supervisor of sight-saving classes, student teacher and the supervisors of rehabilitation. The job objective for each is not decided until after a second conference with pupils and parents.

Of the girls, A chose child care and B, routine factory work. Of the boys, A selected greenhouse work; B, retail clothing selling; C, hotel work. Placement was made by the Rehabilitation Department. In general, the plan followed is the same as that which has been found so successful in Antioch College; the pupils may be shifted from one occupation to another until each eventually finds the job he can handle best.

At last hearing, the Minneapolis plan was working satisfactorily. The results will be noted with interest, since the experiment opens up possibilities of solution for one of the most difficult problems concerning the handicapped.

Eternal Vigilance—the Price of Good Eyes*

E. Clifford Place, M.D.

ALTHOUGH encouraging progress has been made in the prevention and control of diseases leading to blindness, much is still to be attained, and the layman, through knowledge of the factors involved in maintaining good vision, is an important agent in the combat against blindness

THE science of medicine, which in the past devoted itself entirely to the cure of disease, has turned more and more of late years to the attempt to prevent disease. This has produced results over a wide field, so that we no longer have the fearful plagues which ravaged the world in previous centuries. Thus smallpox is almost unknown; typhoid fever, which decimated our armies during the Spanish American War, is rare; diphtheria has almost disappeared; and the discovery of insulin has at least gone a long way toward effecting the control of diabetes.

It may seem to you that this has nothing to do with the subject of prevention of blindness, but actually many of the diseases which are now known to be preventable have in the past been responsible for a great deal of blindness. I mention them also to emphasize the fact that the medical profession is constantly engaged in research to find means to prevent as many as possible of the causes of eye affections which now lead to impaired vision.

How many blind people are there in the United States? The answer to this depends upon what is meant by the word "*blind*." If utter and absolute blindness in both eyes is meant, then the estimate is believed to be about 115,000 in this country. But there is

* Broadcast under the title, "Preventing Blindness," from Station WNYC, May 10, 1938, as part of the Radio Broadcasting Program of the 132nd Annual Meeting of the Medical Society of the State of New York held at the Waldorf-Astoria Hotel in New York City.

a still greater host of people, young and old, who suffer from comparative blindness, varying from those who can perceive motion only, to those who, under the Workmen's Compensation Law in New York State, at least, are considered industrially blind—the eye, in these cases, having 20/200 vision, as represented by the ability to recognize the largest letter on the test chart at a distance of 20 feet.

We believe it is conservative to say that easily one-half of all these unfortunates, whether totally or partially blind, could have been saved from this fate. In some of them, greater medical knowledge of causes of blindness would have helped and, as it is acquired, will help in the future to save others. In many, ignorance and carelessness on the part of the individual himself, or, in the case of children, on the part of the parents, has been responsible.

Congenital and Hereditary Blindness

In order to safeguard your eyes and those of your children, born and unborn, you must know something about the causes of blindness. A good 50 per cent of blindness is congenital and hereditary, and by that I mean that it is caused by an accidental defect in the development of the eye before birth, or by a defect which runs in the family. While it is true that a large percentage of these defects can never be prevented, yet many can be. Whenever I see a person of 70 years of age, or thereabouts, whose appearance and tissues and eyes resemble those of one 10 or 15 years younger, I am likely, upon questioning, to find that his forebears were long-lived and robust on either the maternal or paternal side, or on both sides. And it makes me think, and often say, "How wise it is to choose good ancestors!" But if this be but a pleasantry, its corollary, namely, "How wise for ancestors to choose good offspring," may well have practical value! Thus, if human beings would give some of the thought to the propagation of a healthy race that they give to the breeding of cattle, horses, and dogs, the number of the blind from these congenital and hereditary causes could be diminished. Persons who are blind through heredity should not marry—they will simply bring into the world more children with their own visual defect.

Syphilis

Syphilis, against which the medical profession is now waging a determined war, has taken its toll of eyesight. Children who are born with this disease are subject to a severe inflammation of the eyes, developing a few years after birth, which frequently leaves scars and blindness of varying degree in one or in both eyes. Two bills which were passed at the recent session of the legislature of New York State will be of tremendous help in eradicating congenital syphilis. One of these laws obliges a woman who is expecting a baby to have a Wassermann test of her blood, and the other makes the same test for syphilis compulsory before a marriage license can be issued. Thus the man and woman who plan to marry, and the woman who is pregnant, should find out whether they have this disease, and if they do, they can seek the cure which, with thorough treatment, is quite possible.

Vitamins and the Eyes

That vitamins exert a powerful influence on the eye has long been known. But you will be interested to know that a medical scientist has reported that he is able, at will, to produce cataracts in white rats by feeding them a diet free of vitamin G, while another, at the Texas Agricultural Experiment Station, experimented with pigs. By feeding them a diet containing no vitamin A he was able to produce offspring with no eyes at all. So the diet of the prospective human mother may exert a profound effect on the development of her unborn baby's eyes. Mothers, watch your vitamins! They are most essential for your baby's eye health.

Infectious Diseases of Childhood

Aside from congenital and hereditary defects, the commonest causes of blindness in children are infectious diseases, injuries of various sorts, and tumors of the eye. Measles has taken quite a toll in this list, though parents and physicians now understand the importance of watching the eyes in this disease. Tuberculosis may attack the eye in childhood as well as in adult life. There the preventive measure is the same as in tuberculosis elsewhere in the system—good food, good surroundings, careful hygiene.

Childhood Accidents

The accidents to which children's eyes are exposed are legion, in number and in variety. Weapons of all sorts—"BB" guns, arrows, stones, fireworks and explosives, flying particles, automobile accidents, burns—both with flame and with chemicals—articles used in games and sports, balls, sticks, toys, and a host of others may be mentioned. It is only common sense to say that parents should not leave dangerous articles lying around for normally inquisitive children to handle, and should use judgment in the choice of playthings and games for immature hands to manage. A sad form of blindness is that in which an injury to one eye not only destroys its vision but later, by what is called sympathetic ophthalmia, destroys the other uninjured eye. This occurs in adults as well as in children, but fortunately is not common and can usually be prevented by the early removal of the original eye so blinded.

Posture and Reading

Doubtless you are all interested in the answer to a question which is frequently asked of the eye physician. That question is,"Is it harmful to my eyes, or those of my children, to read in bed?" The answer depends upon three things: whether the illumination is adequate; whether it is correctly placed; and whether the posture is correct. If these three factors are checked, I see no reason why reading in bed is any more harmful than reading in a chair. I believe this question dates back to the days when ceiling chandeliers were the only source of light, and when, in order to see to read at all, a person had to assume an unnatural attitude.

Thus, satisfactory use of the eyes depends upon good posture, that is, with the book or work held at a distance of about fifteen inches from the eyes, good printing, and good illumination. If you find you need brighter light than you used to—if you must go nearer the light to see well to read—it may be a warning that you should consult your eye physician for an examination of the health of your eyes as well as to see if glasses are in order.

Eye Difficulties in Adult Life

Aside from accidents and injuries, the causes which lead to disturbance or loss of vision in adult life are quite different from

childhood dangers. This naturally follows, since adult diseases in general are different from childhood diseases. Thus diabetes, which is rare in childhood, is common in later life; kidney disease and hardening of the arteries belong to the years of maturity. Until we learn more about the prevention of these affections we shall continue to see them and we shall find cases in which they cause disturbances in the eyes. In fact, these diseases commonly attack the eyes, causing spots and hemorrhages in the retina, with resultant visual loss, in many instances even to the extent of actual blindness.

Periodic Health Examinations

This is but another argument for the regular periodic health examination, in order that such diseases may be detected in their early stages, when your physician may help to control them and prevent them from reaching the stage of affecting your eyesight. I believe part of a physical examination in every physician's office should be a test of the vision. A chart hung on the wall at 20 feet will quickly tell whether you have defective vision and your physician can then send you to an eye physician for the detailed examination of your eyes. This should be emphasized in the case of children. Too many parents do nothing about their children's eyes until they get to school, where, finally, the routine examination uncovers a sight defect which should have been discovered a year or two before in the office of the children's specialist. Insist that your physician be equipped to test your vision, and insist that the doctor who takes care of your children find out about the condition of their eyes before they get to school. In this way only can eyes be used in the most efficient way and future eye defects and present eyestrain be prevented.

The Use of Eyeglasses

If your child needs glasses, do not be afraid to put them on him, no matter how young he is. Parents are invariably fearful lest their active child break his glasses in the vigor of his rough and tumble play. It is true that children get their glasses out of order and they break them, but the record shows that serious injuries from such accidents are extremely rare. Instead of fearing glasses and withholding them through pride or for any other reason, be

glad that there are such things as glasses to enable children as well as grown-ups to see correctly and easily. Be sure to have the eye examination made by a medical doctor who makes a specialty of the eye, for only he may use or prescribe the dilating drops which are so essential for an accurate estimation of the trouble, and only he knows and can recognize and treat the diseases of the eye which may be present.

Cataract

But to get back to the adult, I want to mention the two most common causes of blindness—cataract and glaucoma. A cataract is a clouding of the crystalline lens of the eye, which is suspended just back of the pupil. Its formation is gradual, often requiring a number of years to reach the point where vision is seriously affected. Eventually, when the cataract is ripe, as it is called, vision is reduced to the point of recognizing light alone. Formerly it was thought that until this stage of maturity was reached nothing could be done, and, if it happened that a cataract was developing in both eyes at once, the unfortunate individual underwent several years of misery, watching his vision grow dimmer, until finally it was dim enough for the cataract to be operated and sight restored. We now know that this is not necessary, and that a cataract can be successfully removed long before it is ripe. We wait merely until the patient is unable easily to read or work. Although eye drops are frequently used in the hope of delaying the development of a cataract, they are not always successful even in accomplishing this, and once a cataract is well developed an operation is the only cure. No medicine will dissolve it.

Glaucoma

Although one form of glaucoma is violent in its onset and severe in its course, the other form, called simple chronic glaucoma, is very insidious and slow. Its victims are likely some day to find that one eye is nearly blind and the other seriously affected before they realize that anything at all is the matter with their eyes. There is no pain and generally no other symptoms call attention to the eyes. It can be discovered only by unusual alertness on the part of the

patient, or by regular periodic examinations by the eye physician. The common name for glaucoma is "hardening of the eyeball," because as the disease progresses the eyeball becomes firm and tense from the increased pressure of the fluids within it.

The use of eyedrops frequently controls the course of this disease and prevents its further development, but vision lost before its discovery can never be recovered, so the earlier it is found out the better. When medical treatment fails, or loses its grip, operation is often required to control the internal pressure of the eye.

Eyesight—a Personal Responsibility

In any consideration of vision it is important to remember that besides being an optical instrument, the human eye is a living organ, composed of blood vessels, nerves, muscles, and other tissues. All of these parts are subject to the general laws of health. Eye physicians are constantly doing all they can by research and study to learn more about the care of the eyes and the prevention of blindness. For many years the American Board of Ophthalmology, an important board created and perpetuated by eye physicians themselves, has given thorough examinations before permitting candidates to hold themselves out as qualified eye specialists. You, the public, must do your part by consulting the eye physician early—to give him an opportunity to use his knowledge and skill to aid in what every individual must be interested in—the prevention of blindness.

Visibility and Readability of Print on White and Tinted Papers

Matthew Luckiesh, D.Sc., and Frank K. Moss

THE authors note only slight differences in the reflection factors and relative visibility of various tints of paper and conclude that these differences are largely esthetic and do not contribute significantly to ocular comfort

FOR many years certain claims, such as reduction of eyestrain and eye fatigue or increase in eye comfort, have been made for certain tinted papers for clerical and typographical purposes. Notwithstanding these claims and actual promotion and use of certain tinted papers there is no acceptable proof of benefit to human eyes and to human seeing-machines. As is true of all problems of seeing[1] this is a complex one. It involves unobvious or deep-seated psychophysiological effects as well as such relatively obvious factors as eyestrain and fatigue. It involves bodily comfort, mental reactions and even "esthetic comfort" and the fatigues associated with them. Reading is a complex act and the determination of optimum conditions for reading can be achieved only by appraising various attributes of the visual situation and effects of seeing.

The persistence of a state of uncertainty regarding the value of tinted papers may be attributed largely to the practical difficulties of applying appropriate criteria for the appraisal of the more subtle phases of reading, such as the factors of ocular comfort and ease in reading. When these psychophysiological factors are appraised merely by introspective methods, the conclusions thus reached are correspondingly ambiguous and unreliable. It is the purpose of the present investigation to apply several more or less direct behavioristic criteria in determining the visual effectiveness of white and tinted papers as backgrounds for printed matter. In the inter-

pretation of the present data, it is assumed that optimum conditions for critical and prolonged reading are to be determined. Obviously, the visual requirements for casual and occasional reading are far less exacting. The criteria which are primarily appropriate for one objective are not necessarily appropriate for the other.

Criteria

It has been customary to consider visibility and legibility as attributes of printed material. We prefer the term readability rather than legibility since (1) it is descriptive of the act of reading and (2) it is not so likely to be confused with visibility. Obviously, readability is a function of visibility and, in specific cases, the two may be synonymous for empirical reasons. In general, the readability of printed or written material may be defined as that characteristic which determines the speed, accuracy and ease with which it may be read. In other words, it affects the efficiency and efficacy of the reader as a machine and the welfare of the reader as a *human* seeing-machine. It is assumed, for the purposes of this discussion, that the relative merits of white and tinted papers as backgrounds for printing may be determined from measurements of visibility and readability. Obviously, these criteria do not measure directly or even adequately the relative attention-values of various tinted papers or their appearance from an esthetic viewpoint. These factors are involved in the complexity of seeing, but are generally of secondary importance in considerations and measurements of ease of reading. Since the criteria which are used in the present investigation for appraising visibility and readability have been described in detail elsewhere,[1] they are discussed here only briefly.

Relative Visibility.—As the size, brightness or contrast of an object with its background is increased, it follows that the visibility of the object increases. However, quantitative measurements of the relative visibilities of various objects are possible only through the expedient of reducing the visibility of each until the visual threshold is reached. In other words, all visibility measurements are inherently and invariably threshold data. In the present investigation, the threshold conditions were obtained by means of the Luckiesh-Moss visibility meter.[1] This instrument consists

essentially of two colorless photographic filters with precise gradients in density which may be rotated in front of the eyes while looking at an object or performing a visual task. These gradient filters not only reduce the apparent brightness of the visual field due to absorption, but also lower the contrast between the object of regard and its background due to a scattering of light by the photographic film.

A scale value of "1" for this instrument indicates that a simple "black" object upon a "white" background, whose critical detail subtends a visual angle of one minute, is of threshold visibility when viewed under an illumination of 10 foot-candles by a person possessing normal vision, through the corresponding region of the filter. Hence any object which is barely visible through this portion of the gradient filter is assigned a value of unity in visibility. A scale value of "2," for example, indicates that the visibility of the object of regard under the same test conditions is equivalent to that of the standard test object when the latter subtends a visual angle of two minutes. Thus we express visibility in terms of threshold size of object as does the ophthalmologist.

Speed of Reading.—This criterion has been used extensively for appraising the characteristic of readability of printed matter. In such cases it is assumed that the speed with which reading is done or can be done depends upon the ease with which it is read. This is a reasonable assumption in situations involving prolonged periods of reading or extreme differences in the visibility of the printed matter. However, for relatively short periods of reading it does not necessarily follow that the speed of reading will increase when the conditions for reading are improved due to the fact that the effort expended by the reader is not controlled. For example, we have shown[2] that the speed of reading two pages of printed matter was substantially the same under extremely different conditions for reading. In general, it may be assumed that an increase in speed of reading is indicative of more favorable conditions for reading; but that a failure to observe a difference in speed of reading under different conditions does not signify that it is equally easy to read under these conditions. We have shown that speed of performing work is a relatively unsensitive and sometimes misleading criterion of ease or difficulty of seeing. The results of a

recent investigation of the effects of leading upon readability[3] indicated that the apparent influence of this typographical factor did not depend upon the technique of determining the speed of reading. For example, the relationship between the amount of leading and the speed of reading was substantially the same when the subjects read at their natural rates as when they read at their "maximum" rates and were "paced" by continually accelerating the speed of presenting the reading matter. In view of these results, it may be assumed that the measurement of speed of reading by a single technique would be adequate for the purposes of the present investigation. Since other criteria may be applied while the subject reads at his natural rate, this technique was employed.

Ease of Reading.—It is axiomatic that a means for measuring "visual fatigue" would likewise constitute a criterion for appraising ease of reading and by extension—of readability. However, no single appropriate and inclusive criterion of visual fatigue has been established. It is possible to measure certain phases of ocular muscle fatigue. For example, it has been shown[4] that the decrement in amplitude of convergence reserve due to reading for one hour is significantly greater when the reading is done under a low level of illumination than it is under a relatively high level of illumination. From theoretical considerations, this criterion of ocular fatigue is directly applicable in the present research. However, the tediousness of this method and the practical difficulties of applying it to a rather wide variety of cases mitigate its usefulness. We have developed various laboratory techniques[1] with which we have explored the complexity of psychophysiological effects of seeing but these are generally too cumbersome for general application to problems of seeing.

Even though the ocular muscles become fatigued from long periods of reading, it has been shown that they continue to function effectively at the expense of greater effort on the part of the reader. Thus measurements of the ability of the visual mechanism to perform a visual task or test usually do not reveal significant changes in the quality of their performances even after prolonged exertion. Apparently the brain is a hard taskmaster for the organs of vision since clear binocular vision is demanded and obtained under extreme conditions. Hence it should be obvious that the

claims that certain tinted papers are conducive to "ocular comfort" must be supported by other than superficial measurements of visual function and visual abilities.

The acceptance of the conclusion that symptoms of ocular fatigue are seldom revealed from the quality of visual performance suggests the possibility that the effort expended in maintaining a high quality of performance may be reflected in other and less obvious ways. For example, considerations of the meaning and function of the "reflex blink" suggested to us the possibility that this phenomenon might serve as an appropriate criterion for measuring ease of reading. As Ponder and Kennedy stated,[5] "the rate of blinking is closely related to the mental tension of the subject at the time and that the movements (of the eyelids) constitute a kind of relief mechanism whereby nervous energy otherwise unutilized, passes into a highly facilitated path." The results obtained by the authors[1] in using this criterion in other researches indicate that it is one of unusually high sensitivity to physical changes in the stimulus. For example, we have shown that the following changes in the visual situation increase the rate of blinking:

1. An increase in the duration of the period of reading.
2. The use of improper eyeglasses while reading.
3. The addition of a glare-source within the visual field.
4. A decrease in the level of illumination upon the reading matter.
5. A decrease in the size of type read.
6. A decrease in the leading of the type read.

It is obvious that these changes in the visual situation are unfavorable ones from the viewpoints of clear and easy seeing. Hence it may be concluded that the rate of blinking is intimately related to important psychophysiological effects of seeing. As such, it may be assumed that it is an appropriate criterion for the appraisal of the influence upon readability of tint or color of paper used as a background for printed matter.

Typographical Specimens

Since papers are manufactured in almost limitless variations in weight, texture, finish and tint, the selection of a reasonable number of representative samples for appraisal is a highly arbitrary procedure. For the present investigation, ten papers were selected

covering a wide range in tint or color. These papers are commonly used in typographical practice. They were selected without regard to uniformity in surface qualities, and without attempting to obtain a logical sequence from spectral considerations. A description of these papers follows:

Paper	*Reflection-Factor (In Per Cent)*	*Trade Name*
A	85	A & G Special Finish—White (No appreciable tint)
B	70	Blue American Eggshell Text Wove (70 lb.) (Light blue-green tint)
C	82	White North Star Dull Coated (Oxford, 80 lb.) (Slight sepia-cream tint)
D	71	Melon American Eggshell Text Wove (70 lb.) (Reddish buff verging on salmon)
E	81	White Rumford Enamel (Oxford, 80 lb.) (Very slight sepia tint)
F	79	Cochin Yellow D & C Torchon (70 lb.) (Fairly saturated yellow)
G	83	White Oxford Antique Book (60 lb.) (Slight cream tint)
H	74	Green American Eggshell Text Wove (70 lb.) (Light yellowish green tint)
I	82	India Oxford Antique Book (60 lb.) (Deep cream tint or very light buff)
J	38	Cambo Red D & C Torchon (70 lb.) (Fairly saturated yellowish red or reddish orange)

The text matter was printed with black ink in 10-point Linotype Textype with 3 points of leading and a length of line of 21 picas, through the courtesy of the Mergenthaler Linotype Company of Brooklyn, New York. The reading matter consisted of separate chapters from "The Outline of History" by Wells.

Experimental Results

The relative visibilities of the printed matter on the 10 different backgrounds, as determined with our visibility meter under an illumination of 10 footcandles, obtained by indirect lighting from 1000-watt tungsten-filament lamps, are presented in Table I. Each datum represents the arithmetic mean of six series of five measurements each. These series of measurements were taken on different days and the order in which the samples were measured

was reversed on each successive day. It will be noted that the probable errors of these measurements of visibility are of the order of one per cent.

TABLE I

The relative visibility of 10-point Linotype Textype printed upon ten tinted papers, including white and near-white papers:

Subject	*Relative Visibility*									
	A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*
1....	5.04	4.52	5.10	4.76	4.72	4.94	5.29	4.98	5.34	2.80
2....	4.67	4.18	4.64	4.37	4.44	4.65	4.71	4.13	4.70	2.80
3....	2.87	2.73	2.90	2.67	2.78	2.91	2.92	2.82	2.99	1.91
4....	4.69	4.31	4.84	4.61	4.58	4.82	5.16	4.76	5.04	2.87
5....	5.77	5.21	5.62	5.27	5.38	5.87	6.07	5.48	6.10	3.34
Average	4.61	4.19	4.62	4.34	4.38	4.64	4.83	4.43	4.83	2.74
Per cent Probable Error	1.2	1.2	1.3	1.1	1.1	1.1	1.0	1.2	1.2	.9

In the interpretation of the data of Table I it is obvious that the qualities of these papers as surfaces for printing must be considered as well as the spectral characteristics. However, the presence of two variables is more of an advantage than a handicap in this particular problem. It will be noted, from the descriptions of these papers, that three so-called "white" papers (*A*, *C* and *E*) are included in the series. However, in comparison with the tinted papers, the three white ones may be considered to be practically alike from the spectral viewpoint. Since the white papers vary in weight and finish, it is reasonable to assume that differences in the visibility of the same kind of type on each is related to the qualities of these papers as surfaces for printing. Thus differentials in visibility which are assumed to arise from color differences may be compared in magnitude with those probably due to the ink-absorbing qualities of various papers. Although this comparison may be rather qualitative in character, it probably will be a meaningful one to the practical printer. In all cases, the effect of any possible specular reflection was eliminated.

It will be noted that the printing on the white papers *A*, *C* and *E* have visibility ratings of 4.61, 4.62 and 4.38, respectively. Thus

there is a maximum difference in visibility of 0.24, or about 6 per cent, among these so-called white papers. Since this differential in visibility is more than three times as great as the probable error of the difference, the latter may be regarded as statistically significant. Thus it appears that differences in the texture, weight and finish of these papers alter the visibility of the same kind of printing upon these surfaces by about 6 per cent. This is equivalent to a difference in type-size of ½ point as determined by the visibility-meter technique. Thus this datum provides a practical typographical basis for appraising differences in visibility which may be considered to result from differences in the tint of the paper.

If the white paper *A* is selected as a basis for comparison, it will be noted that only two papers, *B* and *J*, give visibility ratings which vary more than 6 per cent (½ point in type size) from the assumed standard *A*. The visibility of black 10-point type on the red paper *J* is 2.74 as compared with a value of 4.61 for the same kind of print upon white paper *A*. In terms of equivalent type-size, 6-point type on the white paper has about the same visibility as 10-point type on the red paper. Obviously, this difference is largely due to the lower contrast due to the lower reflection-factor of the red paper rather than to the ink-absorbing qualities of the paper. From the broader viewpoint of ease of reading the actual color probably plays a part. The relatively low reflection-factor of the red paper not only decreases the brightness of the background of the type but also decreases the contrast between the type and the background. Since paper *B* is bluish in tint, it is not surprising that the visibility of black type on the bluish background is lower than that of paper *A*. In terms of type-size, 9-point type on white paper has about the same visibility as 10-point type on the blue tinted paper *B*. In other words, approximately one point in type-size is sacrificed by using the blue tinted paper.

The visibility of black print on the cream or light buff paper *I* is of particular interest since it is rather widely used. It will be noted from Table I that this paper provides a visibility of 4.83 for the printed matter, or about 4.5 per cent greater than that of the white paper *A* selected as the base of comparison. In view of the differences in visibility which exist among the white papers, it is quite possible that some if not all of this difference in visibility is

due to superior surface characteristics of such paper for the printing of this particular type-face. Of course, even so-called white papers differ in reflection-factor which affects the contrast between the printed matter and the background. Also, the spectral characteristic of a yellow surface is such as to minimize chromatic aberration. It is obvious that this factor is a very minor one in the case of tinted papers of low color saturation. Finally, it will be noted that the visibility of the printed matter on paper *G* is the same as that on paper *I* although the former paper is of a much lighter tint.

Speed of Reading

Four papers were selected for applying the criteria of normal speed of reading and the frequency of the reflex blink, and were selected for the following reasons:

PAPER *A* (white) As an obvious standard of comparison.

I (Deep cream tint or very light buff). Due to the frequent use of this tint in typography.

F (Fairly saturated yellow). Due to the deepness of the tint and high relative visibility.

J (Fairly saturated yellowish red). As a basis of control for the interpretation of the data pertaining to the other papers. This paper is obviously inferior as a background to all of the others and *a priori*, it should be found inferior by all criteria.

In the experimental procedure the subjects were instructed to read at their natural rates and the words read per minute were ascertained. These data are presented in Table II.

TABLE II

The rate of reading was determined by 20 subjects, each of whom read each sample for 5 minutes upon two different occasions. The level of illumination was 5 foot candles in all cases.

	A (*white*)	*I* (*cream*)	*F* (*yellow*)	*J* (*red*)
Words per minute	284	273	266	268
Relative words per minute	100.0	96.2	93.6	94.4
Per cent probable error	. .	1.0	1.3	1.4

The results presented in Table II indicate that the speed of reading was greatest with black print upon white paper. However, it will be noted that the maximum difference in speed of reading among these samples is of the order of 5 per cent although the maximum difference in relative visibility (Table I) is about 40 per cent. These results again emphasize the relative insensitiveness of the criterion of speed of reading or, more broadly, of the rate of performing visual work. It will be noted that the black print on the fairly saturated yellow paper was actually read at slightly slower rate than that of black print on white paper notwithstanding the fact that the visibility was about the same in both cases. Apparently actual color, and the reactions of the subjects to color, has some influence upon speed of reading. At the conclusion of these measurements the subjects were asked to state their preference with respect to these papers. They invariably preferred the white and expressed a dislike for the yellow. All emphatically disliked the red paper. Notwithstanding the difference in magnitude of the subjects' reactions to the yellow and red papers, the speed of reading for these two papers was nearly the same. This case illustrates the inadequacy of the criterion of speed of reading and the possibility of erroneously interpreting such data.

It will also be noted that the black print on the cream tinted paper was read at a slower rate than was the black print on the white paper. Thus the apparent superiority of the former, as indicated by visibility measurements, was not reflected in the actual speed of reading.

Frequency of Blinking

The frequency of blinking during the 5-minute periods of reading was observed and the results obtained from the 20 subjects are presented in Table III.

Table III

These data represent the average rates of blinking as observed for 20 subjects who read each specimen for 5 minutes on two different days. The order of reading the specimens was reversed on successive days:

	A (*white*)	*I* (*cream*)	*F* (*yellow*)	*J* (*red*)
Number of blinks (during 5 minutes)	29.2	28.8	32.4	34.6
Relative rate of blinking	100.0	98.6	110.9	118.4
Per cent probable error	..	3.2	2.6	3.3

Since it has been shown that the frequency of blinking increases with the difficulty of the visual task, it follows, from the data of Table III, that the readability of black print on white paper *A* is about the same as that of black print on the cream or buff-colored paper *I*. Actually, the rate of blinking was somewhat slower in the case of paper *I* than it was for paper *A*. It is of theoretical interest to note that this slight difference in the frequency of blinking in the two cases is consistent with the difference in the relative visibilities of these samples. However, the observed difference in the frequency of blinking is not large nor is it statistically significant with respect to its corresponding probable error. In general, the cream-tinted paper was found to be slightly superior to white paper by the criteria of relative visibility and frequency of blinking, and inferior when appraised by the criterion of speed of reading. In these cases the observed differences possess little statistical significance; and therefore it may be concluded that the cream-tinted paper does not possess unique characteristics from the viewpoint of ease in reading. While this conclusion must be limited to the criteria used and to the results obtained from relatively short periods of reading, it may be pointed out that no significant advantage of the cream-tinted paper was revealed by experimental procedures sensitive enough to detect the influence of such factors as leading, type-size, illumination and deep tints.

It will be noted that the red paper *J* is inferior to all others when appraised by each of the three criteria. On the other hand, the yellow paper *F* provides visibility of the printed matter about equal to the white paper *A*, which has been taken as a standard for comparisons. However, it is decidedly inferior when appraised by the criteria which appear to be appropriate for measuring ease of seeing or some aspect of it at least. Thus it is possible that the dislike for the yellow paper for reading which was experienced by the subjects may originate from physiological as well as psychological causes. We have long contended that a preference for tinted

papers (cream, sepia, etc.) for clerical and typographic purposes may be largely an esthetic matter and that vague feelings of "esthetic comfort" and "esthetic satisfaction" may be erroneously interpreted into eye-comfort.

References

1. The Science of Seeing, by Matthew Luckiesh and Frank K. Moss, D. Van Nostrand Co., New York, 1937.
2. Seeing—A Partnership of Lighting and Vision, by Matthew Luckiesh and Frank K. Moss, Williams and Wilkins Co., Baltimore, 1931.
3. "Effects of Leading upon Readability," Matthew Luckiesh and Frank K. Moss, *Jour. Applied Psych.*, April, 1938.
4. "Fatigue of Convergence Induced by Reading as a Function of Illumination Intensity," Matthew Luckiesh and Frank K. Moss, *Amer. Jour. Ophthal.*, 18, 1935, 319.
5. "On the Act of Blinking," E. Ponder and W. P. Kennedy, *Quart. Jour. Exper. Psych.*, 18, 1927–1928, 89.

Editorials

The Campaign for a "Sane Fourth"

THE National Society for the Prevention of Blindness is undertaking this month a widespread campaign of public education concerning the dangers to eyesight from accidents caused by fireworks. Hundreds of serious eye injuries, some of them resulting in blindness, are the aftermath of the Fourth of July celebration each year. In the belief that Independence Day can be made "safe and sane," the Society and other interested organizations are persisting in their educational efforts—while advocating the enactment of state or federal legislation forbidding the sale of fireworks except for industrial purposes or for use in community celebrations under the direction of an expert on pyrotechnics.

Slight reductions in the number of Fourth of July accidents have been brought about in many of the 500 cities and towns throughout the United States which now have laws prohibiting the sale of fireworks. State or national legislation is needed, however, if we are to find an answer to this problem. Real progress in making the Fourth of July a safe holiday can be achieved only by such wider measures; for nearly every city which has an ordinance is surrounded by good roads leading to suburban towns where fireworks are sold openly and legally.

It is the duty of everyone who values the safety of children to see that laws prohibiting the sale of explosives are widely enacted and strictly enforced. The death or disfigurement of boys and girls, or the loss of sight, as the result of playing with fireworks, is a tragic toll which Americans pay year after year.

The Society's publicity material on the hazards of fireworks is being sent to each of the 2,000 daily newspapers in the United States, and an electrical transcription is being offered to each of the 700 broadcasting stations throughout the country. This record includes an interview with Mr. Lewis H. Carris, managing director, by Mr. Myron Weiss, associate editor of *Time, The Weekly News-*

Some of the students, representing 6 states and the Territory of Hawaii, who participated in the Institute on Eye Health conducted by the National Society for the Prevention of Blindness.

magazine, followed by a brief dramatic sketch of a typical fireworks accident in which a boy is injured. It is the first transcribed radio program produced by the Society.

The Institute on Eye Health

The second institute on eye health conducted by the National Society for the Prevention of Blindness confirms the impression which was created by the first, that there is a distinct field for service in this type of course. The practical nature of the institute is indicated by the fact that the registrants are nurses, physicians, social workers, and teachers, who find it worth while to leave their work for a month in order to take up the study of the special subject of sight conservation so that they may improve their services in their local communities.

Since the first institute was held only a year ago, it is not possible to make definite statements concerning the tangible achievements of the students, but their appreciative letters indicate that they have gone back with renewed enthusiasm to their posts in various parts of the country.

"We were certainly able to get a lot of information in a month. I feel that this was due to the careful planning and preparation of the course," writes one young woman, who is employed as a case reviewer of aid to the blind in West Virginia.

And a school nurse with the Minnesota Department of Health writes: "I considered the information gained at your last institute as very valuable in advising nurses on eye health, especially in their school problems."

A teacher in New Mexico writes: "I will be very busy with my 8,000 children, so I want to take time now to tell you how much I enjoyed and appreciated the privilege of attending the institute. . . . I am so eye conscious that I feel my whole time should be devoted to that particular field."

The sincere enthusiasm and the hope for future achievement which are apparent in each of these letters prove that the institute has taken its place as a potent agency in spreading the knowledge of conservation of vision and prevention of blindness.

The Forum

THIS section is reserved for brief or informal papers, discussions, questions and answers, and occasional pertinent quotations from other publications. We offer to publish letters or excerpts of general interest, assuming no responsibility for the opinions expressed therein. Individual questions are turned over to consultants in the particular field. Every communication must contain the writer's name and address, but these are omitted on request

The Doctor and Sight Conservation*

Park Lewis, M.D.

It is often the obvious that we fail to see. What lies directly before our eyes is often lost to us. It is that which is hidden that we have the urge to seek. "Why," says Goethe, "wander so far when the good lies right before us?" When we wish to hide a thing we leave it in plain sight. Hence it may be that the prevention of blindness has, up to the present time, received so little attention, while much time and money are spent on research. The value of research no one questions. It has been the work in the laboratories and its application to clinical medicine that has resulted in the preservation of so many eyes.

* Appearing jointly, under the title, "Ce Que Sait Tout le Monde," in a forthcoming issue of the *Journal of Social Ophthalmology*, published by the International Association for the Prevention of Blindness, 66 Boulevard Saint-Michel, Paris, France.

It is common knowledge, wherever scientific medicine is practised, that there are more eyes lost through ignorance, carelessness, and indifference on the part of the public than can be saved by the most consummate medical surgery and skill. This is a serious condition that should not exist; that it has existed for ages does not justify our ignoring it. It will continue to exist indefinitely until organized efforts for the control of preventive eye diseases are made by both medicine and society.

There are many reasons for this unfortunate state of affairs. Chief among them is the fact that conditions that lead to loss of sight occur in a large number of cases before they are even seen by one skilled in the handling and treatment of eye diseases. Children are exposed to infections even prior to birth. The ignorance of the public in regard to eyes is stupendous. Even the more intelligent people are not informed

as to the dangers with which their children and others are menaced; how much less informed are others, many of whom can scarcely read and know nothing of sanitary, hygienic care.

Up to the present time, protection of human eyes has been left largely to the skilled physician; and what he has already accomplished is indeed worthy of the highest praise. It is due to his researches that the blindness once so prevalent as a result of smallpox has practically disappeared in all civilized countries. Serious results from diphtheria do not occur where toxin antitoxin has been used to develop immunization. If, today, an ophthalmia neonatorum develops in a modern hospital or in a scientific physician's practice, a question immediately arises, as it would in the event of a typhoid fever outbreak, as to where the responsibility lies. The beneficial reduction of the pressure in glaucoma and the development of our knowledge regarding this disease have saved sight in thousands of eyes that would otherwise have been lost. With the increase of industry, safeguards used to protect the workman from bits of flying metal or emery have saved innumerable eyes; and the magnet has been of immeasurable value as an addition to our instrumentaria.

Nevertheless, throughout the world, particularly in the less advanced countries where population is dense and where sanitation is neglected, smallpox still occurs to an unwarrantable degree with a proportionate loss of sight. The Klebs-Löffler bacillus in many communities still works immeasurable damage. Even in our more progressive communities, 7 to 10 per cent of the children entering the schools for the blind have lost their sight from ophthalmia neonatorum. While this great drop from over 25 per cent has occurred in the last quarter of a century, it is still far more than it should be. Accidents are still destroying eyes notwithstanding the protective devices that are employed. One reason for the failure to prevent unnecessary visual loss is that, up to the present time, systematic efforts have not been made in a large way to inform the public how sight is lost and what should be done to preserve it. Ocular sanitation and hygiene are among the last of the subjects on the curricula of our schools, and preventive measures are not yet a part of the system of instruction in our universities. The young mother is supposed by intuition to shield her baby from harm; but unfortunately intuition is not always a reliable teacher. She should have more specific instruction.

The second cause is even more common. The neglect of the application of known preventive measures causes loss of sight in numberless instances. Human nature is altogether too prone to take it for

granted that things will turn out right. Without knowing it, thousands of well-meaning people have fatalistic ideas and they accept as inevitable that which may be wholly controlled or prevented. In this "best of all worlds," in the medical profession, Dr. Pangloss is still contented to treat congenital syphilis instead of preventing it.

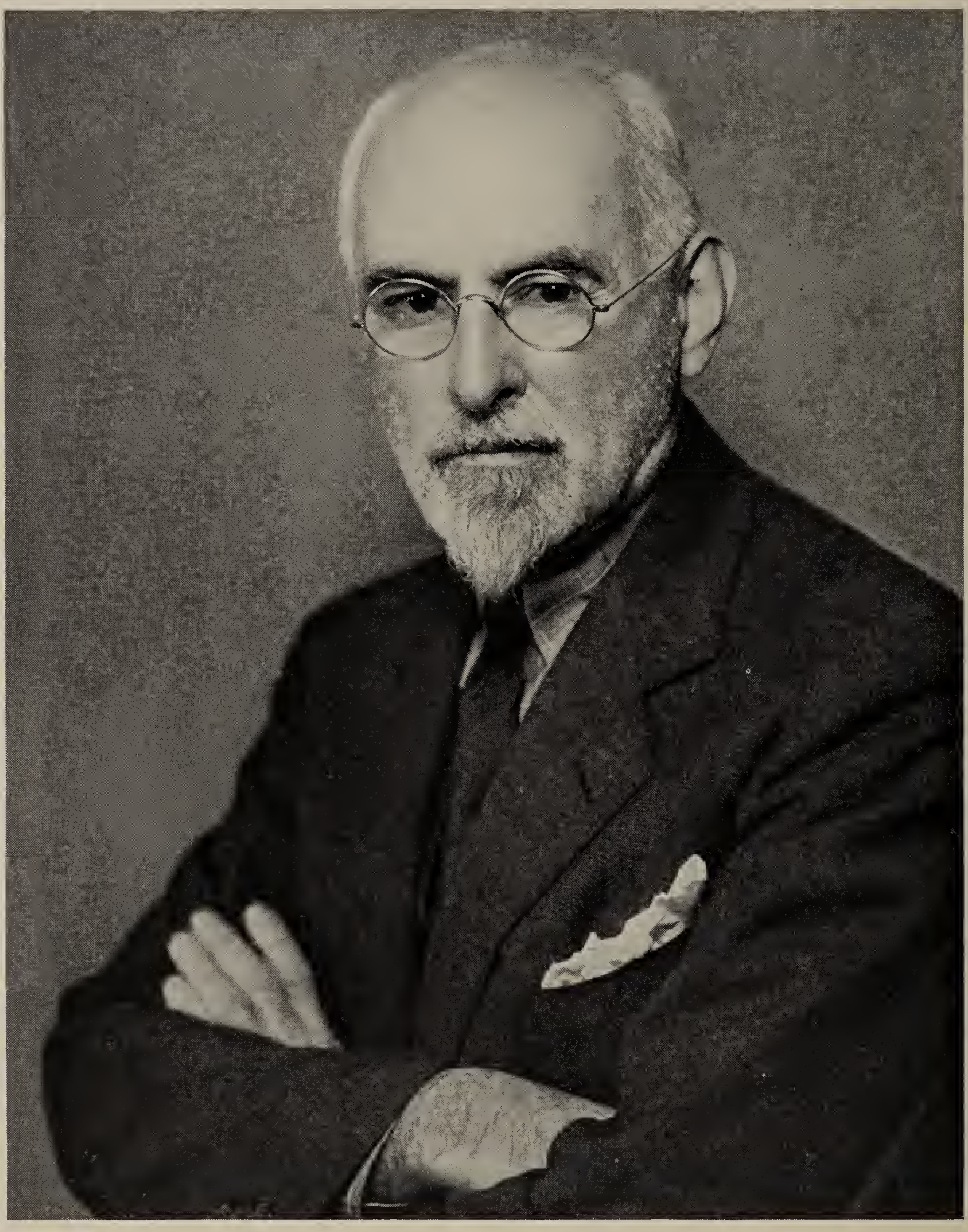
The disasters that come from apathy are even more pathetic than those due to ignorance. The acceptance of the idea that things will come out right, independent of our efforts to make them right, is the fallacy of multitudes who allow dangerous conditions to develop and to continue until they are beyond the possibility of control. This is not only true of acute ocular inflammations: it is far more evident in those subtle, slow forms of eye disease in which there is no outspoken warning. Notably is it the case in chronic simple glaucoma, in which progression is so insidious that irremediable losses occur before help is sought.

A third cause for failure in preventing blindness is indifference—one of the saddest things of the age. This comes from lack of imagination to picture to oneself the loss of so important a function as that of sight. It is deplorable in professional circles when those in whom confidence is placed betray the confidence because of the effort involved to secure measures necessary to save eyes. Conditions are allowed to drift when action should be taken promptly. It is obvious that an obligation rests on both medicine and society to correct a menace so costly both from the humanitarian and from the economic standpoints. Neglect might have been excusable in the past but with improvement in the development of science and in our social relationships, it is imperative that measures should be taken for the betterment of this state of affairs. The general practitioner and—in respect to the eyes—the ophthalmologist occupy a peculiar relationship to the community. They have the confidence of the people; the ophthalmologist in particular knows the avoidable dangers which may affect sight. In the evolution of modern life he has been required to correct and repair damages already done. But it has now become his privilege and is his duty to prevent such damage from occurring. The curricula of the universities have not included lessons in preventive ophthalmology and the ophthalmologist has not felt called upon in many instances to go outside of his special sphere to advance a movement which he might well suppose would diminish his own work. Happily, however, this has not been the case with preventive measures in medicine. When the people learn that early recognition of menacing conditions may prevent more serious disasters and that early help is necessary, they seek such help. It

has been found, where these measures have been instituted, that the work of the physician has been increased rather than diminished thereby. When men and women learn the dangers of syphilis and of gonorrhea and the effectiveness of early treatment, they are keenly anxious to take advantage of this knowledge.

There are three bodies upon whom rests the responsibility of developing a system by which the prevention of blindness may be advanced: the ophthalmologists, to whom the dangers are known; the public, to whom they must be communicated; and the health authorities, by whom preventive measures must be executed. The rigid ethical attitude of the medical profession must be sufficiently relaxed to allow the message to be carried directly to the public. This must be done simply, and, as far as possible, impersonally; but it still must have the weight of authority. The public, on the other hand, needs instruction, which must be given through popular publicity, through lectures, and by every available method to keep lay people informed. To carry the message from the medical profession to the public the department of public health must be an intermediary. Not only must that department instruct people concerning the dangers to sight, but it must make readily available the most effective measures of protection. It is not enough that people be told syphilis leads to blindness: it must be made easily and practically possible for every luetic person, and especially the pregnant woman, to receive the necessary remedial treatment promptly whether they are prepared to pay for it or not. From an economic standpoint it would be less costly for the state to provide such care and to secure suitable treatment for others who had been infected than it would be to care through life for a blind individual or one otherwise physically handicapped by syphilis.

A medium such as the *Journal* of the International Association for the Prevention of Blindness is a necessity. Through it measures should be proposed and it should receive the support of the ablest ophthalmologists everywhere.



Ellice M. Alger, M.D., who, as "A Pioneer in Sight Conservation—Wise, Understanding and Sympathetic Counsellor," is the recipient of the 1938 Leslie Dana Gold Medal.

Note and Comment

Dana Medal Awarded to Dr. Ellice M. Alger.—The Leslie Dana Gold Medal, awarded annually for "outstanding achievements in the prevention of blindness and the conservation of vision," will be presented this year to Dr. Ellice M. Alger, one of the founders of the National Society for the Prevention of Blindness and a member of its Board of Directors. Dr. Alger was selected for this honor by the Association for Research in Ophthalmology in co-operation with the St. Louis Society for the Blind, through which the medal is offered by Mr. Leslie Dana of St. Louis.

The inscription on the 1938 Leslie Dana Gold Medal refers to Dr. Alger as "A Pioneer in Sight Conservation—Wise, Understanding and Sympathetic Counsellor." The conditions of the award set forth that it is to be made for "long, meritorious service for the conservation of vision in the prevention and cure of diseases dangerous to eyesight; research and instruction in ophthalmology and allied subjects; social service for the control of eye diseases; and special discoveries in the domain of general science or medicine of exceptional importance in conservation of vision."

Dr. Alger's qualifications for the award may be readily perceived from a review of his career in ophthalmology. His interest in this subject began during his student days at the University of Vermont and has been sustained throughout his professional career. He spent many years in New York City clinics and dispensaries before 1915, at which time he entered his present position as professor of ophthalmology and hospital surgeon at the New York Post-Graduate Medical School, which is affiliated with Columbia University.

Dr. Alger is the author of a book, "Refraction and Motility of the Eye," and has also written numerous articles for various magazines, including THE SIGHT-SAVING REVIEW.

His keen interest in all matters pertaining to the care of the eyes is indicated by his membership, not only in the leading medical and ophthalmological societies, but also in the Illuminating Engineering Society, of which he was director during the days when Steinmetz used to travel from Schenectady to attend each meeting.

The Value of Tinted Lenses.—The glare of the summer sun, particularly at the seashore, always presents the problem of protecting the eyes by the wearing of tinted glasses. Dr. Lyle S. Powell, in a recent article in the *Journal* of the Kansas Medical Society, points out that, despite the varying claims of optical companies concerning the efficiency of their sunglasses, laboratory tests have revealed that differences in the light transmitted by various well-known brands of tinted lenses are not great. He states that, since each person has his own normal light tolerance, the physician should prescribe that lens which makes the patient comfortable and permits him to tolerate his environmental conditions.

"Streamlining" Headlines Increases Legibility.—The present trend in progressive newspapers toward the use of caps and lower case for headlines is approved by Douglas C. McMurtrie, one of America's foremost authorities on modern typography and layout. "There are three to five times as great differences in contours between lower case letters as between capitals," he says. "Therefore, as we recognize letters by differences more than by likeness, lower case type is three to five times more recognizable and readable. So if he has something to tell quickly and effectively, in news or advertising, the smart man will depend on the more legible of those two alphabets."

Since no reader but "a pensioner at the old men's home" has time to wade through a poorly set-up newspaper page, it is important not only that headlines be readily discernible, but that margins between columns be sufficiently wide to avoid giving the impression of gray typography across the paper.

The typeface should be simple in design and sound in letter forms.

British Survey of Causes of Blindness.—A report recently issued by the Prevention of Blindness Committee of the Union of Counties Associations for the Blind, London, contains an analysis of the causes of 5,290 cases of blindness, indicating that the greater number of cases occur after the age of 50. Cataract is responsible for 24.97 per cent of the cases; glaucoma, 11.09 per cent; congenital and developmental defects, 10.96 per cent; and myopia, 10.24 per

cent. Local infection of the coats of the eye accounts for another 5.97 per cent. Congenital syphilis is the underlying cause in 5.12 per cent of the cases and acquired syphilis in another 2.83 per cent. Ophthalmia neonatorum is the cause of 4.91 per cent of the cases. It is heartening to note, however, that only 16.15 per cent of the patients with ophthalmia neonatorum were born after 1914 (the year in which the regulations for ophthalmia neonatorum came into force) and not a single one was born after 1932.

Other causes of blindness include general disease, such as vascular, renal, and cerebral diseases, and diabetes. Industrial accidents and diseases account for only 1.39 per cent.

Facilities of Health Library in Great Demand.—The services of the National Health Council Library, 50 West 50th Street, New York, N. Y., were extended more than 1,500 times during the year 1937 to research workers from all parts of the United States, in addition to staff members of the 17 organizations of the Council, including the National Society for the Prevention of Blindness.

The library now contains more than 6,000 volumes and 30,000 pamphlets dealing with public health, sanitation, hygiene, and related subjects. More than 500 medical and educational periodicals are received regularly from all parts of the world. As an aid to public libraries in the selection of books on health subjects, a list of approximately 300 health books of interest to the general public is being compiled at present.

Polarized Light Banishes Glare.—Polarized light may be applied practically in desk lamps which eliminate glare from papers on the desk; in sunglasses that do away with sunlight reflections on pavements, water, ice, and snow; and in headlights and windshields of automobiles, which cut off the glare from approaching vehicles.

Cross-Eyed American Beauty.—In a vivid description of early American esthetics given by Bishop Diego de Landa in his writings on Yucatan, it is shown that the New World natives of the sixteenth century held it a grace to be cross-eyed. This condition was artificially brought about in infants by the mothers, who suspended

a small plaster from the hair down between the eyebrows and reaching the eyes. This in time caused the child to be permanently cross-eyed.

Maryland Society Surveys Work for 1937.—The Maryland Society for the Prevention of Blindness has recently issued its annual report for the year 1937, presenting a survey of the year's accomplishments in educational activities, clinical assistance, rehabilitation, and legislative activities. The work of the Society has made significant progress and offers much hope for future development.

Transplanting Corneas to Restore Vision.—The transplanting of corneas from corpses to restore sight to the blind has been suggested by Dr. Martin I. Green, an ophthalmologist of San Francisco, who hopes that the humanitarianism of this proposal will result in an amendment of the present law of property in corpses. In order for the operation to be successful, the corneas must be taken from a corpse within 24 hours of death. Hence medical schools may not be used as a source of supply, for they are required to wait for at least a day before disposing of unclaimed cadavers. Then, too, under law, a corpse is the property of the closest relative or friend. Hence the obtaining of written permission to take a dead person's cornea is required.

Heavy Blows Fail to Smash Goggles.—A highly effective device for convincing workmen of the strength of safety goggles is being used by the Gulf Oil Corporation in Port Arthur, Texas. The demonstration consists of lifting a three-pound machinist's hammer by a chain, and letting it drop on a safety goggles lens placed on a block. Since workers going through the gates are allowed to pull the hammer as many times as they desire, the lens has been subjected to heavy punishment during the past three months. Nevertheless, it still remains unshattered.

Electric Shock May Cause Cataract.—The claim that cataract may result from severe electric shock is substantiated by the fact that in the larger electric eels the eyes are almost always affected with cataract.

Hand and Eye Co-ordination.—Studies in ocular dominance reveal that 75 per cent of all human beings are right-eyed and 23 per cent are left-eyed; in only 2 per cent is ocular dominance indifferent or distributed between the two eyes. Practically all right-eyed persons are right-handed, but in the case of left-eyed persons this relation is not as constant, probably because many persons who were originally left-handed have been trained to prefer the right hand. While training, accident, or disease may reverse the manuality of a person, eyedness, i. e., the exclusive use of either the right or the left visual line for sighting, persists tenaciously throughout life. Only severe ocular disease early in life or practical blindness in adults will cause its reversal.

Student Awarded $15,000 for Eye Injury.—A student in a New York City technical high school, seriously injured when hot lead splashed into his eyes, has been awarded $15,000 for the injury. The vocational school was held at fault because it failed to provide goggles for the student.

Lighting Requirements for Healthful Housing.—In a recently published report on the basic principles of healthful housing, the American Public Health Association recommends the provision of adequate artificial illumination and avoidance of glare. At least 6 foot-candles should be provided in all occupied rooms, with at least 10 foot-candles wherever reading, studying, or sewing is done. A minimum of one foot-candle should be provided on stairs and in passageways in order to minimize the danger of accidents. Glare effects should be avoided in the design and location of fixtures. In the kitchen shadows on the sink and work table should be avoided, if necessary by the installation of a second fixture, and in the bathroom the central fixture may be replaced by lighting adjacent to the mirror. Sleeping-rooms should be protected from artificial light sources, such as street lights and electric signs.

Madame Curie Victim of Cataract.—Readers of the recently published biography of Madame Curie, written by her daughter, will be interested in the description of Madame Curie's fight against the threat of blindness from cataract. Several operations were performed and useful sight was finally restored to her.

Bespectacled Cameras.—The miniature camera enthusiast with defective eyesight can now secure a miniature camera equipped to take a correcting lens as part of its range-finder.

Contax cameras, among the leaders in the present miniature field, can be secured with a ring into which the photographer inserts a tiny lens specially prescribed by his oculist. The lens itself cannot be supplied with the camera, because a different one is required by each individual, as is the case with ordinary spectacles.

Fewer Blind Children in London.—There has been a very gratifying reduction in the number of blind children of school age in London. The number in 1914 was 415, or 0.62 per thousand; in 1936 there were 85 such children, or 0.17 per thousand.

College Men Deficient in Vision.—Only one of 50 college students tested for admission to the U. S. Army flying corps is able to pass the physical examination, most of the applicants failing because of defective vision. This is believed to be partly attributable to the poor lighting in many college dormitories.

New Research Center for Prevention of Blindness.—Headquarters of the W. H. Ross Foundation for the Study of Prevention of Blindness were opened in Edinburgh in April. This foundation is the outcome of a generous gift of £40,000 by Mr. William H. Ross, himself a victim of progressive blindness, and is at present the only endowed foundation in Scotland for the purpose of research into the causes of blindness and means of preventing blindness.

New International Sight Conservation Publication.—The first number of the *Journal of Social Ophthalmology*, published by the International Association for the Prevention of Blindness in Paris, appeared in May, 1938. The magazine is now printed in French and English, and, should the need arise, additional languages will be used. The editors plan to maintain close contact with the International Ophthalmological Council, the International League against Trachoma, the International Public Health Office, and the national organizations engaged in prevention of blindness activities.

The *Journal* has made an auspicious beginning and will undoubtedly be of great value in advancing the prevention of blindness movement.

National Society Notes.—Lectures by members of the staff of the Society formed the major part of the morning sessions of the second Institute on Eye Health, March 28 to April 22, which was attended by 19 students who are regularly employed as nurses, social workers, or physicians. The institute was held under the direction of Miss Ruth B. McCoy, director of the Bureau of Prevention of Blindness, New York State Department of Social Welfare, through the courtesy of that agency. Dr. Willis S. Knighton, a surgeon on the staff of the New York Eye and Ear Infirmary, was the director of the medical lectures and arranged for visits to New York City eye clinics. The students were given ample opportunity for discussion and personal conferences.

The Society's keen interest in all legislation pertaining to the venereal diseases is evidenced by the attendance of Mr. Lewis H. Carris, managing director, and Mr. David Resnick, director of publicity, at the sessions of the Senate and House Committees at which the federal anti-venereal disease bill was given a hearing. Mr. Carris submitted for the records a statement concerning the relationship of venereal diseases to blindness and impaired vision.

Forthcoming activities of Mr. Carris will include attendance at the American Medical Association meeting in San Francisco, June 13–17, and at the National Conference of Social Work in Seattle, June 20–28. While in Seattle he will lecture at the summer course for sight-saving class teachers, to be held at the University of Washington; before coming East, he will also lecture at the courses on eye health at the University of California.

The American Medical Association meeting will also be attended by Miss Isobel Janowich, editor, who will be in charge of the Society's exhibit, Miss C. Edith Kerby, statistician, and Miss Anette M. Phelan, Ph.D., associate in health education. Following this meeting, Miss Janowich will be in charge of the Society's exhibit at the National Conference of Social Work in Seattle, which will also be attended by Mr. Carris, Mrs. Eleanor Brown Merrill, associate director, Miss Kerby, and Mr. Resnick. Both Mr. Carris and Mrs.

Merrill will participate in the program of the Conference; Mr. Resnick will handle publicity and Miss Kerby will be available for conferences and consultation, as will the other staff members in attendance.

Mrs. Winifred Hathaway, associate director, has been in Honolulu since the middle of May, making plans for the summer course for sight-saving class teachers which she will conduct at the University of Hawaii from June 27 to August 5. In addition she will participate in the Hawaiian Conference of the New Education Fellowship, which is to be held June 19–25.

The Society is co-operating with the University of California, Berkeley, Calif., in the presentation of two courses to be conducted by Dr. Phelan, beginning June 27. The course on "Eye Health of the School Child" will be open to teachers, nurses, and school administrators; and the course on "Eye Health in Teacher Education" will be open to a limited group of 15 students, to be admitted only with the permission of the instructor.

Miss Eleanor W. Mumford, R.N., associate for nursing activities, attended the Biennial Nursing Convention in Kansas City, Mo., April 25–29, where she took active part in the program and also presented an exhibit of the Society's activities as they relate to the fields of nursing.

As a part of the Society's annual campaign against the dangers of fireworks a radio talk on "Fourth of July Fireworks Accidents" will be given over station WNYC on June 30 by Miss Margaret Schaefer, industrial information secretary.

The Executive Committee of the Society has appointed Dr. Purman Dorman to serve as a member of the Advisory Committee. He succeeds Dr. Harry V. Würdemann, who died on February 2. Dr. Dorman is a practising ophthalmologist at the Virginia Mason Clinic in Seattle and an officer of the State Board of Ophthalmology. He is deeply interested in the prevention of blindness movement and has devoted much time to planning the organization of sight-saving classes in the state of Washington.

Current Articles of Interest

Trachoma in American Samoa, F. Harbert, M.C., U.S.N., *American Journal of Ophthalmology*, April, 1938, published monthly by the Ophthalmic Publishing Company, St. Louis, Mo. The prevalence of trachoma in Samoa is established by clinical and laboratory investigation, which shows that more than 40 per cent of the school children are affected in some degree. Primitive methods of treatment have led to an extremely high percentage of blindness (1,050 cases of bilateral blindness per 100,000 population); but the substitution of appropriate medical treatment, as advocated by the Naval Administration, has reduced bilateral blindness more than one-third in the course of one decade. The widespread use of silver protein, and, lately, of weak zinc-sulphate solution at least helps to reduce the secondary infections which are largely responsible for the complications resulting in blindness.

The Lighting of Industrial Interiors, L. E. Tayler, *Safety Engineering*, April, 1938, published monthly by the Alfred M. Best Company, Inc., Albany. Laboratory experiments have revealed that human efficiency and visual acuity increase with higher levels of illumination and that fatigue curves begin to approach straight lines as conditions for seeing are improved. Given good eyes, the chief enemies of good seeing are glare and inadequate illumination. Good lighting may generally be explained as an even distribution of well-diffused illumination of a specified amount, arrived at as a result of accurate measurement and a study of the task that must be performed.

With the increased knowledge of the advantages of correct light and the advance in illuminating engineering, light sources, and equipment design, there is no reason today to tolerate the hazards of poor seeing conditions in industrial plants. Good illumination goes hand in hand with the reduction of accident hazards, and "light conditioning" industrial areas will permit the human seeing machine to function so that it may do its work efficiently, easily, and safely.

Syphilis and Optic Atrophy, Perk Lee Davis, M.D., *The Pennsylvania Medical Journal,* April, 1938, published monthly by the Medical Society of the State of Pennsylvania, Harrisburg. A study of 179 cases of syphilitic atrophy, none of which had received adequate early treatment. Many of the patients had objective signs of syphilis which were not recognized early enough to save sight. From observation of these cases it appears that all patients with syphilitic optic atrophy have one important symptom in common, that is, loss of vision, either partial or complete.

One of the greatest stumbling blocks in the early diagnosis of syphilitic optic atrophy is the infrequency of gross neurologic signs of central nervous system syphilis. A neurologic examination of the most meticulous sort is necessary to pick up the smallest clue which might lead to the diagnosis. In all suspected cases an examination of the blood and the cerebrospinal fluid should be made. This is vitally true because optic atrophy may occur early and, for a long time, be the only sign of locomotor ataxia. It is highly important that patients afflicted with syphilitic optic atrophy receive competent medical treatment.

Ocular Birth Injuries of the Newborn, Harold M. Block, M.D., *Texas State Journal of Medicine,* May, 1938, published monthly by the State Medical Association of Texas, Fort Worth, Texas. Although it may seem that ocular birth injuries are rare, this is true only of the more serious and obvious cases. Some studies have revealed that retinal hemorrhages are present in 50 per cent of infants born through contracted pelves, 40 per cent in premature births, 40 per cent in protracted and difficult labors, 20 per cent in normal babies after normal labor. It has also been shown that 25 per cent of all infants show some ocular disturbance if examined in the first 24 hours after birth. To appreciate this matter properly one must bear in mind the fact that the eyeball of the infant is not as deeply seated in the orbit as is that of the adult, nor is the nose as well developed. The globe is therefore deprived of the protecting margins of these structures, and rendered far more vulnerable to traumatism.

Occasionally conjunctival hemorrhage results from forced instillation of silver nitrate and it is possible that damage may be done

to the deeper structures of the eyes due to hasty, forcible opening of the lids to instill the silver nitrate.

Of great importance is traumatism to the ocular nerves and muscles and many authors mention the possibility of nystagmus resulting from birth injuries.

Sight-Saving: A Co-operative Program, Winifred Hathaway, *Edison Electric Institute Bulletin,* April, 1938, published monthly by the Edison Electric Institute, New York, N. Y. Stressing the importance of co-operation in conserving vision, Mrs. Hathaway points out that the protection and care of the eyes is the responsibility not only of the medical or illumination specialist, but extends even to manufacturers and salesmen of lighting equipment and other materials for classroom or office use. She also gives high credit to the pioneers in science who have performed seeming miracles in preventing diseases that affect the eye: Jenner, who discovered the possibility of making people immune to smallpox, one of the chief causes of blindness and impairment of vision in the centuries before his discovery; Pasteur, who demonstrated the theory of the transmissibility of germs and was thus indirectly responsible for preventing much loss of sight; Koch, the discoverer of the tuberculosis bacillus, who opened the way not only to stamping out the disease itself, but also its effect on the seeing process; Schick, who developed a test for diphtheria, a common cause of blindness; and Credé, who discovered that infection of the eyes of the newborn may be combated by the use of silver nitrate.

Hysterical Blindness in Children, Ernst Wolff, M.D., and George S. Lachman, M.D., *American Journal of Diseases of Children,* April, 1938, published monthly by the American Medical Association, Chicago, Ill. A survey of the literature in the field of hysterical amblyopia, with application to two cases which were successfully treated by an understanding of the emotional factors involved. Both cases were concerned with young girls who were emotionally upset over the loss of a beloved close relative and both of them had witnessed the special interest given to a friend who had trouble with her eyes. The friendly understanding of the doctor led to a prompt recovery in both cases. Although suggestion apparently

played a large part in patterning the symptoms of both children, no direct suggestion was used in treating them. Neither were any of the psychoanalytic techniques employed. Nevertheless, it must be realized that understanding of the functional manifestations described depends on Freud's concept of hysteria as a physical expression of an emotional conflict.

The Treatment of Minor Conditions in the Eye, N. Bishop Harman, F.R.C.S., *British Medical Journal,* April 16, 1938, published weekly by the British Medical Association, London, England. A survey of such common diseases of the eye as contagious and irritant conjunctivitis, ophthalmia neonatorum, and lacrimal obstruction, with suggestions for effective examination and treatment.

Ophthalmo - Oto - Neurology, George W. Mackenzie, M.D., F.A.C.S., *The Medical World,* April, 1938, published monthly by the Medical World, Philadelphia. Treating the subject of nystagmus from the viewpoints of the otologist and the neurologist as well as the ophthalmologist, the author outlines the technique of examination for nystagmic jerking, indicating the symptoms which reveal whether the nystagmus is physiologic or pathologic, and describing in detail the causes underlying this condition.

Book Review

Medical Treatment of Cataract. A. Edward Davis, M.D., Philadelphia: F. A. Davis Company, 1937. 161 p.

A most concise and well-organized monograph on the medical treatment of cataract has been written by Dr. A. Edward Davis. He believes that senile cataract is a preventable disease, and pleads for a wider recognition of the need for medical prophylaxis and treatment of a disease which is responsible for over one-third of all blindness in persons over 64 years of age.

The material considered and the views held by Davis may be summarized as follows:

(1) Early diagnosis is of paramount importance.

(2) In many cases the presence of other systemic degenerative diseases indicates the necessity for searching for lenticular opacities.

(3) The various etiologies may be local causes, focal infections, arthritis, arteriosclerosis, radiational influences, endocrine, general metabolic and nutritional disturbances. Therefore, it is necessary to consider cataract in connection with every complaint of decreased vision in patients in the older age groups.

(4) Patients should be informed of their trouble early in order to secure their entire co-operation. Inasmuch as senile cataract is frequently an ocular manifestation of systemic or degenerative disease, one must treat the patient as well as the disease.

(5) In Davis' hands lens antigen apparently has proved most beneficial for he states that, by its use, the ordinary senile subcapsular cataract may be arrested in from 75 to 80 per cent of cases when treatment is instituted in the early stage.

(6) Davis believes that lens antigen, by inciting the body cells to the formation of specific antibodies and creating a mild leukocytosis, fortifies the healthy lens fibers against toxins; at the same time the dead lens fibers and cataractous or necrotic material are destroyed or liquefied.

(7) Lens antigen or lens protein should be employed only when the patient's health and habits have been carefully scrutinized. After determining whether the patient is sensitive to intradermal

tests a course of injections should be given. In conjunction, potassium iodide is given by mouth in moderate doses. After the course of injections has been completed instillation of dionin is also employed.

(8) Dietary treatment is stressed, attention being called especially to the beneficial effects of foods containing vitamins. Overeating is responsible for more degenerative diseases than all other causes combined. In regard to proper diet, Davis quotes Barborka, who has stated that all diets must possess the following essential requirements in order to protect and maintain health: adequate protein, mineral elements, vitamins, sufficient calories for energy requirement, and water. In the arthritic and gouty diatheses, alkaline waters have proved of value.

(9) Subjectively, it is usually only late in the course of the development of the lens changes that the patient becomes aware of his visual deficiency.

(10) Another important point which is emphasized in the nonoperative treatment of cataract is the proper correction of errors of refraction.

The case reports should be carefully studied.

In conclusion, Dr. Davis' book presents an excellent discussion of the preventive and medical treatment of cataract. Numerous important factors in the preventive and medical treatment of cataract are discussed and especial consideration is given to lens antigen treatment, which has apparently been of value in the author's experience.

The reviewer believes that we must be ultra-conservative in evaluating the results of any form of treatment and that the efficacy of treatment of cataract requires especial study because of the slow development of lens opacities in the majority of cases.

CONRAD BERENS, M.D.

Briefer Comment

TWENTY-FIVE YEARS OF HEALTH PROGRESS. Louis I. Dublin, Ph.D., and Alfred J. Lotka, D.Sc. New York: Metropolitan Life Insurance Company. 611 p. ill.

This book is invaluable as a reference source to public health workers and others requiring authentic data on mortality. Al-

though it contains nothing directly pertinent to vision, reference is made to diseases and accidents which may indirectly affect the eyes. Charts and maps in abundance present graphic summaries of the trends in the mortality among the industrial policyholders of the Metropolitan Life Insurance Company from 1911 to 1935.

An Investigation of Student Study Lighting. John O. Kraehenbuehl, Ph.D., Urbana: University of Illinois, 1937. 36 p. ill.

In this study, made in the fraternity, sorority, independent, and dormitory rooms of the University of Illinois, exact data are tabulated for such items as the dimensions and general coloring of the study room and the type, number, and size of lamps used. It was possible to give each item an exact rating on a numerical scale, and in this way to determine the advantage of one lighting system over another. The general conclusion is that the typical study room is poorly lighted, but the condition can be corrected by the intelligent use of lamps, the cost of which is small in comparison with the benefits received. A briefer version on the same study appeared in the March, 1937, issue of The Sight-Saving Review.

General Hygiene and Preventive Medicine. John Weinzirl, Ph.D., Dr.P.H., and Adolph Weinzirl, M.D., C.P.H. Philadelphia: Lea and Febiger, 1937. 424 p.

Workers in the fields of public health and social service will be particularly interested in this text on the control of disease. The chief subjects considered are immunization, use of specifics, control of environment, and group control. The subjects of eyestrain and illumination are given brief but effective attention.

Health and Human Welfare. William E. Burkard, Ph.D., Raymond L. Chambers, Ph.D., and Frederick W. Maroney, M.D. New York: Lyons and Carnahan. 632 p. ill.

The authors of this text-book for secondary school students discuss a wide number of health subjects in a most appealing manner. The book is inspirational in tone, showing the beneficial effects to be derived from proper attention to health. Vision is but one of the many subjects considered, but the discussion, though brief, is valuable, as the eye is considered not only from a physiological point of view, but also in connection with diet, study and working conditions and first aid.

Current Publications on Sight Conservation

Note.—The National Society for the Prevention of Blindness presents the most recent additions to its stock of publications. Except for the more expensive ones, single copies are sent free upon request. Unless otherwise specified, they are reprinted from THE SIGHT-SAVING REVIEW. New publications will be announced quarterly.

265. **Pioneer Work in Sight Saving,** Helen L. Smith. Reprinted from *The Sight-Saving Class Exchange,* June, 1938. 16 p. 10 cts. An account of the first sight-saving class in the United States, which was opened in 1913 with the author as the first teacher.

266. **Report of the Committee on Conservation of Vision of the State and Provincial Health Authorities of North America,** A. C. Jost, M.D. 8 p. 5 cts. A study of the achievements, actual and potential, of the state and provincial public health authorities in the conservation of vision.

267. **Science Saves Eyesight,** Donald G. Cooley. 12 p. 10 cts. By means of modern scientific instruments, minute defects in the shape of the eyeball may be measured and the interior of the eye may be examined for the location of foreign bodies or the symptoms of either visual or systemic disease.

268. **1937 Survey of Fireworks Accidents in Maryland.** 8 p. 5 cts. As a means of minimizing the number of personal injuries caused by Fourth of July fireworks, the Maryland Society for the Prevention of Blindness recommends adequate legislation and safety education.

269. **New Trends in Sight-Saving Class Activities,** Winifred Hathaway. 12 p. 10 cts. The philosophy underlying sight-saving class teaching has made much progress since the early years of special education. Through increased knowledge of the aptitudes as well as of the limitations of her pupils, the modern sight-saving class teacher trains them to play a useful rôle in the world's work.

270. **Eternal Vigilance—The Price of Good Eyes,** E. Clifford Place, M.D. 4 p. 5 cts. The layman, through knowledge of the factors involved in maintaining good vision, may do much to prevent blindness.

271. **Visibility and Readability of Print on White and Tinted Papers,** Matthew Luckiesh, D.Sc., and Frank K. Moss. 12 p. 10 cts. The authors note only slight differences in the reflection factors and relative visibility of various tints of paper and conclude that these differences are largely esthetic and do not contribute significantly to ocular comfort.

272. **The Doctor and Sight Conservation,** Park Lewis, M.D. 8 p. 5 cts. The responsibility for prevention of blindness rests on the

ophthalmologist, who is aware of dangers; the layman, who must be informed; and the health authority, who must execute preventive measures.

D118. Eyes and the Office Worker, Arthur J. Bedell. Reprinted from *Hygeia*, March, 1938. 4 p. $1.50 per 100. The essentials of ocular comfort for office workers are proper refraction, preservation of good general health, and efficient illumination.

D119. Report of the Eye Health Committee of the American Student Health Association. Reprinted from the *Proceedings* of the American Student Health Association and the *Journal-Lancet.* 4 p. $1.50 per 100. A study of visual defects of college students.

D120. No One Enters This Plant Without Goggles, Harry Guilbert. Reprinted from *Factory Management and Maintenance*, March, 1938. 4 p. $1.50 per 100. The Pullman Company, by spending $25,000 to reduce eye injuries, has saved $116,000 on compensation expenses, in addition to setting a model record for reduction of eye injuries.

Contributors to This Issue

Dr. A. C. Jost, who is serving as chairman of the Committee on Conservation of Vision of the State and Provincial Health Authorities of North America, is the executive secretary of the Delaware State Board of Health.

Mr. Donald G. Cooley, a well-known writer on scientific subjects, was formerly editor of "Science and Medicine" of the *Literary Digest* and is at present editor of *Your Life Magazine.*

No introduction to REVIEW readers is required for **Mrs. Winifred Hathaway,** associate director of the Society.

Dr. E. Clifford Place is a practising ophthalmologist associated with the staffs of the Brooklyn Eye and Ear and Methodist Episcopal Hospitals and the North County Community Hospital of Glen Cove.

Matthew Luckiesh, D.Sc., and **Frank K. Moss** are the authors of numerous books and articles on the subject of light and sight. They are both associated with the lighting research department of the General Electric Company.

Book reviewer: **Dr. Conrad Berens** is a member of the Society's Board of Directors.

Illumination Levels and Eye Comfort Conditions*

Walter B. Lancaster, M.D.

COMFORT is subjective, individual, negative, equals absence of discomfort, profoundly affected by habit, custom, even fashion. Time is an essential factor in eliciting discomfort. Even more important than level of illumination in many cases is proper distribution (quality of lighting)

IT IS comparatively easy to design an installation for efficiency; somewhat more difficult to design an installation for esthetic effect which will please a given group; much more difficult to design an installation which a given group will at once pronounce comfortable. We must discriminate sharply between comfort on the one hand and efficiency and healthfulness on the other. Comfort standards are not by any means interchangeable with optimum standards without qualification.

What is Comfort?

It will pay us to study what is meant by comfort in general and by eye comfort in particular, before attempting to determine what influence illumination levels may have.

First of all, comfort is a subjective affair. It depends on individual personal preferences. It is not, therefore, predictable. Those conditions which are most beneficial from the point of view of health and efficiency are not necessarily what a person will term most comfortable for him.

In the second place, comfort is a negative affair rather than positive. We have stronger terms for positive feelings, such as: pleasure, happiness, delight, felicity, thrill, rapture. Comfort is freedom

*A paper presented before the Thirty-second Annual Convention of the Illuminating Engineering Society, Minneapolis, Minn., August 29–31, 1938.

from objectionable sensations and conditions, or escape from previous discomfort, that is, from painful or disagreeable or irritating conditions. It, therefore, often depends in detail on the previous conditions which become irksome, even painful, the escape from which is comfort.

This negative aspect appears in the various synonyms: repose, ease, relaxation, freedom from irritations and from strain or tension, tranquillity; while discomfort implies the presence of pain in some degree, usually the lowest form of pain: uncomfortable, incommoded, tired, fretted, displeased, bothered, ill at ease, hurt.

In the third place habit and previous experience have a preponderant influence in determining what an individual deems comfort. This is so important it demands illustrations.

Take, for example, eating. We prefer to sit in chairs, but others have preferred reclining; others squatting on the floor. We prefer knives, forks, and spoons, others prefer chop-sticks or fingers; many like to use the knife instead of the fork as a shovel to transfer food from plate to mouth. Or take articles of clothing: here we see the influence not only of habit but of fashion. A hat may be entirely efficient as a protection, but the wearer will be very uncomfortable if it is conspicuously out of style. Women's shoes, bad as they look to us, are pronounced by women to be comfortable, and the wearers would be very uncomfortable, many of them, with efficient footwear scientifically adapted to walking and standing.

So a person who is accustomed to reading or working with a certain type of lighting may complain bitterly when you substitute a better but very different one, just as one who is accustomed to working or reading in a badly ventilated room may be made actually uncomfortable when you take measures to make the air fresh and the temperature normal. There are people still living who can not be convinced that any artificial light is as comfortable as the old student lamp—a kerosene lamp.

A fourth factor in comfort is the time factor. This is very significant. A posture, for example, may be pronounced quite comfortable, but if the person is required to maintain that posture long, it becomes irksome and eventually quite uncomfortable. It is a severe and crucial test of comfort to subject it to the ordeal of time. One of the early methods of testing lighting arrangements, a

method used by Ferree and Rand, was to require the subject of the test to read until he felt discomfort of the lids—a scratchy, sandy irritation due to hyperemia. The criterion was the time required to produce the discomfort. It was found to be a fairly dependable criterion of different types of lighting, direct, indirect, and semi-indirect, the results agreeing with those found by other methods.

Thus a lighting arrangement may seem quite comfortable at first but judgment should be deferred until sufficient time has elapsed to give it a severe test.

We are often confronted with a dilemma of this kind: we design a lighting installation, which we know is good, but the users declare it is not comfortable and is generally unsatisfactory. What shall be done with such cases? Must we permit inadequate, inefficient, inartistic and even actually injurious types of lighting because ignorant, prejudiced, cranky people prefer them and assert that, as for themselves, they are more comfortable with them than with the new-fangled arrangements we prefer?

The key to this dilemma is to be found in the fact that when put to the test, when given a fair trial involving sufficient time, the improved lighting makes reading or working so much easier, speedier, with fewer mistakes and with so much less fatigue that only the most obstinate, perverse, and bigoted old fogies persist in declaring the new way less comfortable.

Thus we are driven to the conclusion that in designing an installation for comfort, we cannot go far wrong if we are guided by what is conducive to efficiency, healthfulness, and esthetic satisfaction, but we must be prepared to encounter the tremendous inertia of habits and prejudices. To overcome a fixed habit may take no little time and all the might of authority and diplomacy you can bring to bear. It behooves us not to be too rigid in our own standards but adapt our designs to the desires of those who employ us. Sometimes it is possible to obtain permission to arrange one room with lighting which is really good. Then those who are at all open to conviction can be converted by actual trial.

Illustrative Case

A man complains that he cannot read long in the evening. His eyes get tired and uncomfortable and he has to stop and listen to

the radio. He wears glasses for reading, as he has a small refractive error and is presbyopic (55 years old). Asked about the lighting of his library where he reads, he says it is very good—"the best there is." Questioning brings out the facts. The room is rather large, 18 x 22 feet in size, with dark beamed ceiling, walls covered with book shelves, and therefore dark—dark leather-covered furniture with dark rugs and hangings. On the table at his left is a handsome bronze lamp with a shade which allows the light to shine directly on his book over his left shoulder as he sits in an easy chair before the open fire. "Yes," he says, "the light is perfect; the trouble is with my glasses."

Exhaustive examination of his eyes shows that the glasses are well chosen. They are such as thousands of others with similar eyes are wearing with comfort.

To convince him that the lighting is not good is no easy matter. In the first place such a room is very difficult to light. The esthetic satisfaction from the present arrangement is a powerful factor. Sometimes it is possible to induce the patient to arrange another room, perhaps a bedroom, with what you think is good lighting, to be tried for a few weeks. Be sure to make it clear that a trial of one evening is wholly inadequate. First, choose a room with white ceiling and very light walls. Install two or three indirect lamps with at least three watts per square foot of floor space—about 1000 watts. If the lamps are properly located with reference to the reading chair, the whole ceiling and the walls down to the tops of doors will be lighted and the ceiling above the chair will be especially light. This will give about 15–20 foot-candles on the book with no glare, no harsh contrasts, no dark spots anywhere in the room. Of course, he will not like it, he will hate it at first. After finding that he can read much longer with much less fatigue and discomfort, he may be persuaded.

The difficulty in convincing such a man is greatly increased by the fact that very many persons can read with comfort the whole evening with the lighting first described. Perhaps other members of the family are doing so. Hence his desire to blame the glasses.

To have the room redecorated with a light enough ceiling for indirect lighting may be refused. The next best thing is a compromise, one of the types of lamp which diffuses the light somewhat.

Types of Discomfort Resulting from Poor Illumination

What form does discomfort take when eyes are made to work under unfavorable illumination? The symptoms are local and general.

The local signs and symptoms are redness, sensations of heat, dryness, scratchiness, sometimes photophobia, all due to, or characterized by, hyperemia, that is, excess of blood to the eyeball and lids. These feelings cause increased winking automatically, since winking is a protective reflex. Hence the value and soundness of the winking reflex test ("blinking," they prefer to call it) of Luckiesh and Moss. There may be increased flow of tears, also a protective reflex. Feelings of fatigue, tired, aching, pulling sensations are described.

The general symptoms are such as headache, restlessness, irritability, sometimes sleepiness and the like. Conspicuous in some cases is an increase in mistakes, and the whole situation merges into the picture of inefficiency and of eyestrain.

As was stated above, a design which fulfills the requirements for efficiency, healthfulness, and esthetic satisfaction will be found to meet the demands for comfort in the majority of cases if the test is sufficiently prolonged to be crucial. Absence of these and similar symptoms spells comfort. Hence we must study the problem: What levels and kinds of illumination produce these symptoms and how can they be avoided in order to achieve comfort?

The level of illumination needed for comfortable seeing depends on: (1) the work being done, and (2) the efficiency of the eyes. The factors to be considered are the fineness of the work (visual angle subtended by the objects), the contrast with the surrounding field, the time factor or speed required, and the accuracy demanded.

The efficiency of the eyes depends on their freedom from errors of refraction (hypermetropia, astigmatism, myopia), from defects of fixation and binocular vision (heterophoria, fusion amplitude), freedom from defects of transparency of the cornea and the other media and freedom from other defects.

Some people with sound, healthy eyes doing ordinary reading say they are perfectly comfortable and can use their eyes indefinitely with a level of five foot-candles; others are not comfortable with less than 15 foot-candles. When the work is more exacting,

finer, less contrasted, more hurried, with accuracy very important, then a higher level of illumination is required—up to 50 or 100 foot-candles, often more.

Again, when the eyes are defective, more light is needed. I sometimes tell a patient: "There are two ways by which you can get relief from the symptoms which are troubling you—you can wear some glasses which will correct a slight refractive error which you have or you can improve the lighting under which you are working." This will surprise some who think eye specialists always give glasses to everybody in whom they detect errors of refraction. The fact is that everyone has some errors of refraction and some aberrations but the eyes are provided with a mechanism for the automatic correction of or compensation for many of these. So long as this is done without in any way overtaxing the mechanism, glasses are unnecessary and the patient is better off without them. I wish to stress at this point the way errors of refraction and other ocular defects bring out defective lighting and vice versa. It may be compared to diet and stomach trouble. It takes a person with a sensitive digestive mechanism easily disturbed to bring out the defects in a meal which would cause no trouble whatever in a healthy individual. Conversely, a poorly cooked, badly selected meal will bring out the digestive troubles which would otherwise not have been apparent. For a person with a good strong digestion, any kind of food will do, but the person with dyspepsia and cranky digestive apparatus must be fussy about what he eats. So, for a person with good strong eyes, any light will do, but the individual with "weak eyes" must be very particular about lighting.

Thus it is possible for well selected glasses to help out a poor lighting arrangement and for a good lighting arrangement to help out poorly selected glasses, or even, in some cases, take the place of glasses.

To sum up the question of what level of illumination is needed for comfort conditions, the answer is that no fixed standard is, in the nature of things, possible. It is convenient and helpful to have codes which state certain standards. It should be understood that, as Luckiesh and Moss point out, "codes imply a degree of definiteness and precision which would be extremely difficult, if not actually impossible, to substantiate by actual test." Personally, I do

not find 10 foot-candles sufficient for my comfort when reading good print. I prefer 20 foot-candles but do not complain much if I have 15. For certain fine work, like examining an eye or operating, 100 foot-candles is needed, but here it is not a question of comfort as the process is short—it is really a question of seeing fine detail.

How Much Illumination is Essential?

I now wish to emphasize as strongly as possible that illumination may be at an optimum level (say 20 foot-candles for reading in my own case), and yet be very uncomfortable. The importance of the level of illumination is overemphasized by many engineers. Admittedly, it is the most important single feature in illumination—the light must be strong enough to see by!

In brief, it may be stated that the amount of light required depends on the eyes and on the work. The eyes have to be considered in deciding on the level of illumination because, if the eyes are deficient, they need more light. This has been so conclusively demonstrated so many times that no further argument is needed as to the validity of the general proposition. For such a standard task as reading 12-point type (as this article is set) on good paper, 10 foot-candles will do—15 foot-candles is better (assuming normal eyes). When the work is finer or when the contrast is less, more light is needed. When speed is required and when accuracy is important, more light is needed.

Of course, daylight out-of-doors is much brighter. This does not prove that the eyes need an equivalent level of illumination for efficient work. The eyes are marvellously adaptable to different levels of brightness and the only way to settle such a question is by actual trial, not by theory. On the other hand, the fact that the eyes perform satisfactorily in bright daylight shows that there is no danger of getting artificial light too bright provided its distribution is correct—properly diffused and free from glare.

Importance of Light Distribution, Quality of Lighting

The factors, aside from brightness or level of illumination, which determine comfort in the use of the eyes are extremely important. They are important not only for comfort but for health and efficiency, and yet they are not stressed by engineers nor by salesmen

who sell electricity for lighting or fixtures for lighting. These salesmen are the people to whom the public turn for authoritative information. They expect those who sell lighting equipment to give expert and sound advice about it. What they are advised to buy is something that is "the latest thing" or something that is going to save several cents an hour or something that "everybody is buying."

It is the distribution of the light that is so all important for comfort and for avoidance of eye strain. Luckiesh and Moss have adopted the term "quality of lighting" to cover this and it seems to me a good term. In the past, we have spoken of quality of light (not lighting, note difference) as depending on wave-length, *i. e.*, spectral quality.

The importance of the wave-lengths has been much exaggerated. It has been assumed that daylight must be of better wave-lengths than ordinary yellowish artificial sources. So it is far better for color matching, but for comfortable, efficient, and healthful use of the eyes the yellowish light of most artificial sources, such as ordinary Mazda bulbs, is better than the "daylight bulbs."

This is not surprising since the retina has a selective sensitivity to the central part of the spectrum—yellow green—in spite of the fact that the eye was developed under conditions of natural lighting long before artificial lighting was invented.

The most widely recognized defect of distribution of light is glare. It is too much light in the wrong place. It results in discomfort and even eyestrain.

In artificial lighting it is usually possible to avoid glare from exposed sources within 20 degrees or 30 degrees of the line of sight. What is not widely appreciated is that a subtle form of glare comes from lights that are bare, exposed sources even if wholly outside the field of vision when at work. In many cases, this is explained by the specular reflection from the work, but even when so located that the specular reflection is thrown away from the eyes of the worker there is still a cause of discomfort and eyestrain when the source of light is a small one and therefore a concentrated and relatively intense source. Of course, the remedy for this is a large source or many small sources so arranged as to be virtually one large source. This means diffused light.

If we try to understand why this is true—how it works—we see

at once it is not because the bright source irritates the eye directly, since it is not visible when looking at the work. Therefore, it must be due to the light from the work—a page of a book, for example. Does it make any difference to the eyes if a page is illuminated with light of a certain brightness, let us say 30 foot-candles and free from specular reflection, whether the source is small or large, single or multiple? The answer is yes. If the majority of those who use this arrangement have strong, tough, healthy eyes, they will notice no discomfort even after prolonged use. Recall what was said about cooking for dyspeptics and for healthy people. If we want to measure this effect, we must have a sensitive meter. We have to rely on subjective tests to prove the facts; objective tests may be used to judge the installation.

How does concentrated light produce a different effect on the eyes? There must be something about the way the paper and print look that is different. It is usually described as, on the one hand, a hard trying effect when bad, and when good, as a soft agreeable effect. In some cases the texture of the paper is such that an almost infinite number of small shiny surfaces are present, visible with a microscope but not noticed with the naked eye. At other times slight curvatures of the surface may produce minor specular effects. Nearby surfaces may be specular. Whatever the explanation, there is no doubt of the fact that concentrated sources produce harsh, hard effects, strong contrasts, sharp shadows and discomfort and eyestrain.

An engineer needs no test to decide whether or not a given installation supplies diffuse lighting—he sees at a glance. For the layman, a test is useful and the Lancaster shadow test, described years ago, is a simple and effective one. A pencil is held parallel to and a handbreadth from a sheet of white paper which is held in the other hand so that it is at right angles to the incident light. The shadow of the pencil will be sharp and well defined if the source is small and concentrated, but the shadow will be blurry and indistinct in proportion as the source is large and the light diffused. What the eyes prefer is the soft agreeable effect of the diffused light which comes from a large area, for example, out-of-doors from the sky; indoors, from a large window or windows, not too far off, or from a white ceiling and walls, etc.

It is difficult to get a high degree of brightness, say 100 foot-candles, indoors with indirect lighting without producing glare from the excessive brightness of the ceiling and walls. If the work is such that the ceiling is out of sight, and if the lower part of the walls and the floors and furniture are of a neutral tint, neither too light nor too dark, a high degree of illumination is possible with indirect lighting.

A common fault in indirect lighting is throwing a beam of light on a comparatively small area of the ceiling. This becomes the direct source and is small enough to be equivalent to a large direct luminaire and to cast a fairly defined shadow. The indirect luminaire should be so designed that the beam spreads out over the whole ceiling and the walls down to the tops of the doors. This often calls for more than one luminaire per room.

For higher levels of general illumination, one can use semi-indirect luminaires if they are installed with care so as not to be in sight and so that the whole ceiling and walls are lighted.

For still higher levels of illumination, it is necessary to resort to what Luckiesh and Moss call "Lighting Plus," *i. e.*, local direct lighting in addition to the general illumination.

Summary

Comfort is subjective and cannot be measured objectively. It is negative rather than positive, depending on the absence of things that are irksome, offensive, painful. It depends very largely on habit and even fashion. Time is important since what is at first comfortable may, if subjected to the ordeal of time, prove very uncomfortable.

Experience shows that what is conducive to efficiency, healthfulness, and esthetic satisfaction will prove in the long run comfortable when the inertia of habit and prejudice has been overcome.

The level of illumination most conducive to comfort cannot be stated in definite figures of universal application because it depends on the eyes (eyes with defects need more light) and on the task (more difficult and exacting tasks need more light).

Comfort is more likely to suffer today from poor distribution of light than from improper level of illumination. For comfort, light must be diffused. Individuals vary. Those with strong, healthy

eyes, not overworked, are satisfied with any old light. For sensitive tests, sensitive eyes are needed. This is very important since many people can work with inadequate lighting without eyestrain or even discomfort, but those with vulnerable eyes may suffer seriously. To attempt to set a definite standard in foot-candles is therefore to attempt the impossible. The illumination must be adapted to the task and to the peculiarities of those who are to perform it. The competent engineer will realize this and will make it clear to his clients.

One-Eyed Drivers

H. R. DeSilva, W. H. Frisbee, Jr., and P. Robinson

THE one-eyed driver differs from the normal driver in that his field of vision is much more limited, he is more susceptible to glare, and his depth perception is notoriously bad

ONLY about 20 states make any check on vision for the driver's license. Nearly half of these states that require visual tests are in the northeastern section of the country. There is, however, no agreement regarding visual standards. The prescribed requirements for visual acuity for one eye vary all the way from 20/20 to 20/70.

Minimum Acuity Standards

One-Eye	
20/20:	Delaware, Rhode Island.
20/30:	Connecticut, Maine, Arkansas, Iowa, Kansas, Nebraska, South Carolina.
20/40:	Maryland, New York, California, Oregon, Virginia.
20/50:	New Jersey, Washington.
20/70:	Massachusetts.

FIGURE 1

A reason for the absence of uniformity lies in the lack of attested facts on the part played by vision in driving. The standards suggested by different individuals or agencies also do not conform with one another.[3, 10, 13, 16] The fact that they vary among themselves and are based upon insufficient research shows the need for further investigation.

Suggested Visual Standards

	UNRESTRICTED LICENSE			RESTRICTED LICENSE		
Suggested By:	One-Eyed	Better Eye	Worse Eye	One-Eyed	Better Eye	Worse Eye
Amer. Med. Assoc.		20/40	20/100		20/65	
European		20/40	20/200			
Lauer, Dr. A. R.	20/30	20/30	20/50		20/60	20/80
Mason, Dr. R. E.	20/30	20/40	20/100			
National Safety Council	20/20	20/30	20/30	(glasses) 20/20 20/30		
Sherman, Dr. E. S.				(daylight) 20/40		

Figure 2

It has been estimated that from one to two per cent of all motorists are one-eyed, whereas from 20 per cent to 40 per cent have a deficient eye which handicaps them in driving. No state prohibits either group from driving. The facts about the driver with only one eye will be discussed in the first part of the paper, followed by findings regarding the driver with a deficient eye.

The One-Eyed Driver

Hazards of the One-Eyed Driver.—A person with normal eyes has a field of vision of about 190°. The one-eyed individual, on the other hand, has a field of between 110° and 135°, depending partly upon the protrusion of his good eye and the bridge of his nose. The person with pop-eyes and a small nose will naturally see farther around his nose than a person with deep set eyes. On account of the loss of vision for detail toward the periphery, the useful vision for either the one-eyed person or the normal person is usually much less than the figures above. Figure 3 illustrates the approximate perspective of the two-eyed person; of the person with only a right eye, and of the person with only a left eye.


As You See With Two Eyes
Blind Spot
As You See With Left Eye Only
Blind Spot
As You See With Right Eye Only

Figure 3

The most obvious compensation for the handicap of having one eye is for the driver to keep his head turned at an angle so as to spread his visual field evenly on both sides. Many one-eyed persons do not compensate nearly enough, since turning the head attracts attention and they are anxious to conceal their defect. Another form of correction possible is to keep the head and the eyes roving continually from right to left while driving in order to bring possible dangers from the side into the field of clear vision of the good eye. This habit is unfortunately not common enough among one-eyed persons.

The hazards of driving are not the same for the right-eyed and left-eyed driver, since we steer our cars from the left-hand side and drive on the right side of the road. For convenience, we are listing the various hazards as they affect the right-eyed driver more than the left-eyed driver, and vice versa.

> **Left-eyed persons** with deficient or blind right eye have difficulty: (1) In perceiving pedestrians stepping off sidewalk, or walking along the roadway either by day or night; (2) in viewing road when making a right turn; (3) in perceiving cars approaching from the right of intersections; (4) in passing other cars (apt to cut in too soon or clip rear bumper in cutting out); (5) in perceiving road signs and traffic lights; (6) in backing out from angle parking; (7) in perceiving cars parked at an angle backing out; and (8) in keeping on right side of road (on account of inability to see edge of road easily).
>
> **Right-eyed persons** with deficient or blind left eye have difficulty: (1) In perceiving pedestrians on account of losing them in blind spot; (2) in viewing road when making a left turn; (3) in perceiving cars approaching from the left at intersections; (4) in avoiding oncoming cars (since they guide by right edge of road); (5) in perceiving road signs, on account of losing them in the blind spot; (6) in backing out from parallel parking; (7) in perceiving jaywalkers in middle of road; and (8) in watching traffic in rear mirror when located on side, as in a truck.

Blind Spot.—We are blind in a small round region of the eye where the optic nerve enters the eyeball. As illustrated in Figure 3,

the blind spot is located to the right of the right eye fixation point and to the left of the left eye fixation point. In using both eyes, anything falling within the blind spot of one eye is visible to the other eye, and vice versa, so that the two eyes perceive an uninterrupted field.

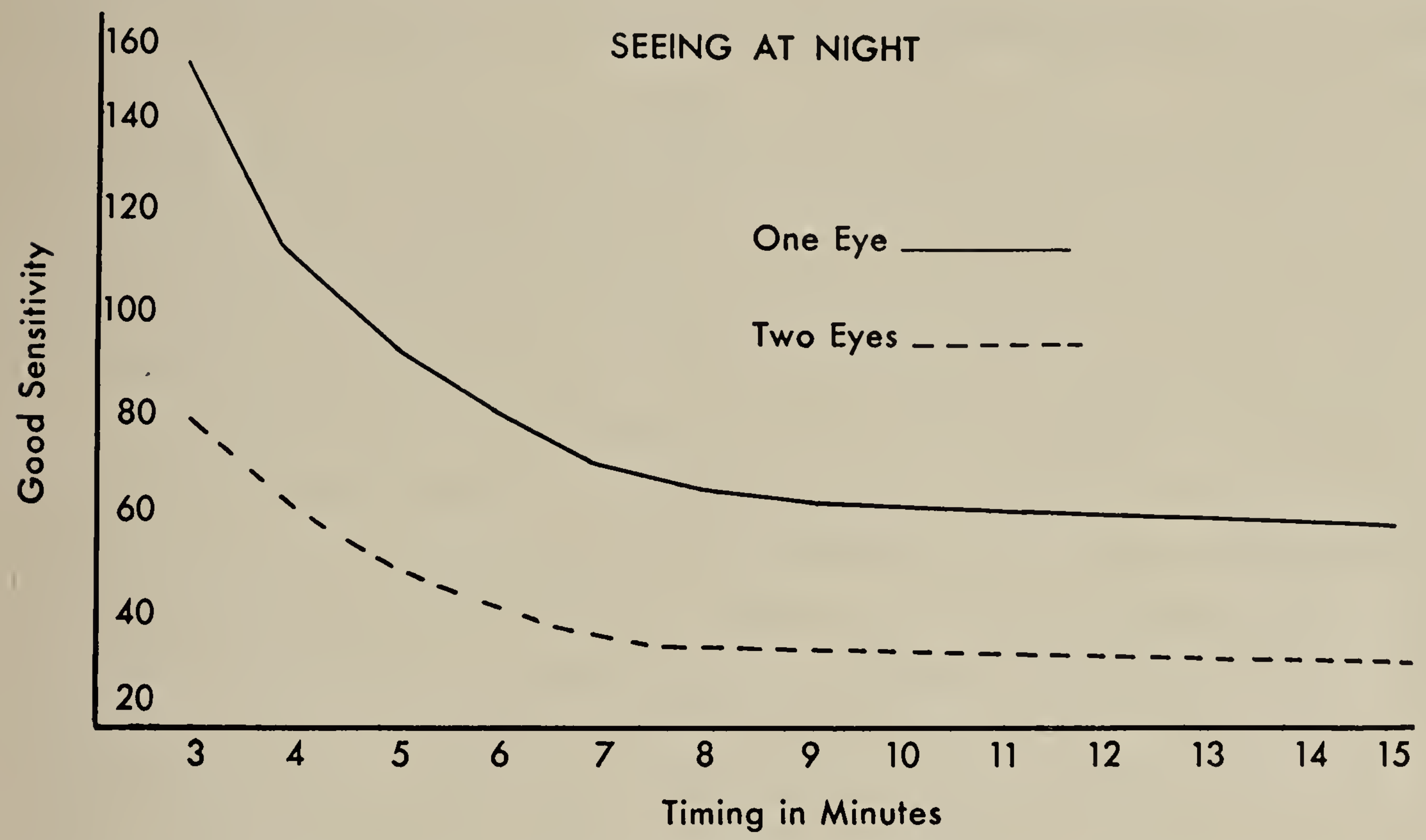
The one-eyed person, however, has no good eye to perceive the field not seen in his blind spot, so he is really blind in the respective spots indicated on the windshield in Figure 3. The blind spot covers an area that is approximately 7° in diameter. Thus, whereas on the windshield the blind spot covers an area of only two or three inches, at a distance of 50 feet it covers an area of six feet. For example, a standard road sign (12″ x 18″) falls within the blind spot as close as 12 feet, a standard stop sign (24″ x 24″) at 16 feet; a child (4 feet tall) at 32 feet; a man (6 feet tall) at 48 feet; a truck (7 feet high) at 57 feet.

Hence the one-eyed person is likely to miss something which is obscured by his blind spot until it is too close for him to avoid by halting or swerving his car. The only possible way a one-eyed driver can overcome the blind spot hazard is to keep his eye moving constantly so as to expose all oncoming objects on sensitive parts of the retina.

Night Driving.—Either of two defects—night blindness or glare blindness—makes it impossible for a motorist to drive with comfort and safety after dark. The one-eyed person is handicapped even more. In fact, he has more difficulty than the average driver who does not have either defect. One investigation has shown that one eye cannot withstand glare as well as two.[12] The difference is quite marked.

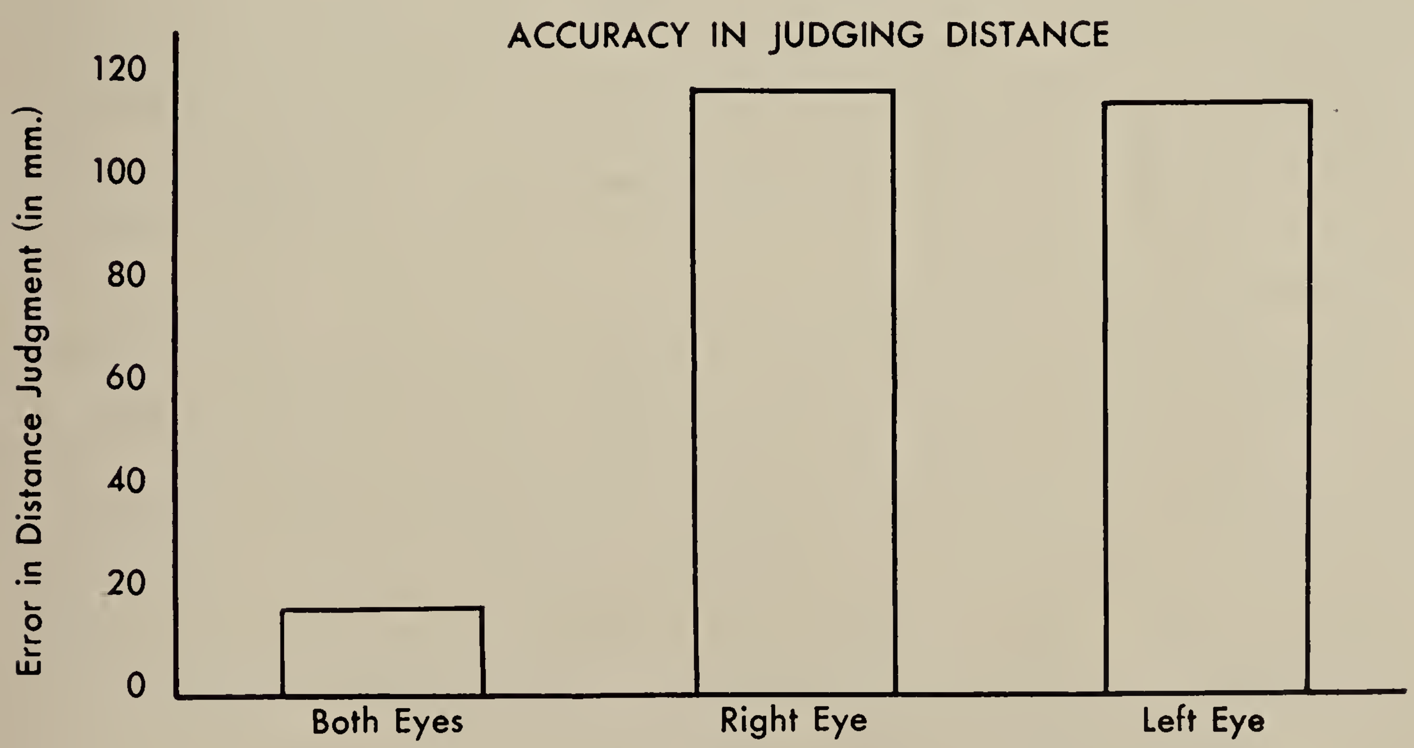
Not only is a one-eyed person more sensitive to glaring lights, but it takes him much longer to recover from the glare and see the road clearly again. Two eyes can see in the dark about twice as well as one.[5] (See Figure 4.) In other words, at night the one-eyed driver cannot see objects on the road as quickly or as distinctly as the two-eyed person. Hence it behooves the one-eyed motorist to drive as little as possible at night.

Speed of Seeing.—When an object is exposed for a very short period of time, the two eyes can perceive it in about half the time that one eye can.[11] Thus the ability of the two eyes to grasp



This chart indicates the differences in adaptation time to darkness when using one eye or both eyes. As the eyes become adapted to the darkness, it is possible to see more clearly, but the two eyes are almost 50% more sensitive than one eye. Two eyes can therefore distinguish dim objects on the road (such as pedestrians) more easily and quickly than only one eye.

FIGURE 4



When using only one eye, the errors in judging distances are much greater than when using both eyes. This chart is based on work done with test for distance judgment in the U. S. Army.

FIGURE 5

quickly an emergency situation is distinctly superior to the one eye alone.

In driving it is frequently necessary to shift the eyes from the road to the instrument panel. An investigation of the speed of focussing back and forth on a far and then a near object gives the two eyes a clear victory over one eye.[15] This speed of adjustment of the eyes is also lengthened by advancing age and fatigue.[8]

Depth Perception.—One-eyed persons are notoriously bad in their judgment of distance and depth. On the depth perception test used by the U. S. Army in selecting aviators, it was found[6] that the average error of one eye is 6 to 10 times greater than the error for binocular judgment. (See Figure 5.) The judgments of the one-eyed persons are nearly always underestimations, that is to say, the object appears closer than it really is.[4] It is fortunate that the one-eyed person perceives things as closer rather than farther away, since it is better to stop short than to overrun a dangerous obstacle.

The Driver with a Deficient Eye

The Proportion of Drivers with a Deficiency in One Eye.—The problem of the one-eyed driver is not so important as that of the deficient eyed driver since there are so many more of the latter. Whereas only one or two per cent of our drivers are one-eyed, our results show that 30 per cent to 40 per cent of drivers have a visual acuity of 20/30 or less in one or the other eye. At least 20 per cent of our drivers have a visual acuity ranging from 20/40 to 20/200 in either one or both eyes.

The significance of a deficient eye is commencing to be appreciated as a result of recent studies in motor vehicle departments. In an investigation made by the California Department it was found that 20 per cent of all the motorists involved in fatal accidents in San Francisco had an acuity of 20/30 or less in one eye. On checking the nature of the accidents the figures showed that the collision took place on the side of the weak eye in every case. Moreover, no driver realized that he had a weak eye.[9]

Check-ups of 70 drivers apprehended for "cutting in" on Los Angeles highways revealed that half of them (35) had defective right eyes.[2]

Effects of Deficiency in One Eye on Driving.—Tests by army medical men at Mitchell Field showed that aviators with the most acute vision had the best depth perception.[6] Other studies have shown that any loss of visual acuity in either eye or in both eyes tends to render depth perception more difficult. For example, one investigator holds that with one eye normal an impairment of vision by 20/30 in the other eye injures depth perception and that an impairment of vision in one eye of 20/70 makes it almost impossible for the two eyes to work together to give an efficient perception of distance and depth.[1] In other words, we need two almost perfect eyes to perceive depth effectively. It has been noted that the effect of the aging process on the eyes in reducing acuity and leading to far vision also impairs depth perception in both normal and deficient eyed persons.

The speed of the eyes to pick up objects as they rove up and down the road in driving has been shown to be much slower when one eye is below par. In other words, since the perceptual time is poorer in the person with one deficient eye he is likely to be less alert in apprehending less obvious dangers.

Compensation and Improvement.—It has been claimed by some medical authorities that a person who has always been without one of his eyes has a better depth vision than the person who loses an eye after he has had years of binocular experience.[7] This is probably to be explained by the fact that the person with the congenital loss has had more years of experience than the person with the later accidental loss.

At any rate, it has been clearly demonstrated that it takes several months, six at least, for a person who has lost one eye to recover some of his ability to deal with near and far space.[14] The lesson from this is that a person who loses one eye should not be allowed to drive a car for at least six months or perhaps a year, until he has had a chance to re-educate himself.

Wiley Post was an excellent aviator before he lost his vision. After losing it he practised diligently and eventually recovered his depth perception well enough to fly a plane skilfully again.

Fortunately, it is easier for a one-eyed person to adapt himself to a moving judgment of depth, such as is necessary in driving a car, than to a judgment of stationary depth as is called for on most

tests for depth perception. Probably the most important of all of the factors by which we judge depth in a moving automobile is parallax or the judgment of distances determined by the rate of movement of objects with reference to one another. This judgment of relative rate of movement of objects is a dynamic, constantly changing judgment. On this account the one-eyed person can continually check his judgments by noting his under- and overestimations as objects approach and pass him, and also by moving his head from right to left to get the same kind of stereoscopic depth perceptions available to the two-eyed person.

Conclusions

The results presented outline the various handicaps of the one-eyed and the deficient-eyed drivers. Unquestionably, most of these drivers are oblivious to the defects which predispose them to accidents. The greatest human hazard arises not from the defects but from ignorance of the dangers from such defects. For most of these drivers the solution lies in personal re-education adapted to their individual needs. For others, and especially those who have shown themselves incapable of profiting from re-education, the solution lies in revocation of their licenses.

Bibliography

1. Adler, H.: *Clinical Physiology of the Eye.* New York: Macmillan, 1933, p. 240.
2. Bagby, S.: "I Didn't Think," *California Highway Patrolman*, June, 1937, p. 35.
3. Baker, J. S.: "Public Safety Memo. 42." National Safety Council, Inc., February, 1938.
4. Carr, H. A.: *An Introduction to Space Perception.* New York: Longmans, Green and Co., 1935.
5. Cook, T. W.: "Binocular and monocular relations in foveal dark adaptation," *Psychological Monographs*, xlv, No. 3, 1934.
6. Deyo, B.V.: "Monocular and binocular judgment of distance," *American Journal of Ophthalmology*, p. 343, May, 1922.
7. Grazianskaia, L. H., and Rosanova, E. P.: "Determination of adjustment to absence of binocular vision in vocational selection," *Sovietskii Viestnik Opht.*, viii, pt. 3, p. 469, 1936.

8. Luckiesh, M., and Moss, F. K.: *The Science of Seeing.* New York: Van Nostrand, 1937.
9. Mason, Paul: "Drivers' tests." Society of Automotive Engineers, West Coast Regional Transportation and Maintenance Meeting, November 18–19, 1937. Reprint.
10. Mason, Dr. R. E.: "Minimal visual requirements for safe driving," *Journal Missouri State Medical Association,* 32:367, 1935.
11. Richmond, P., and Ebert, E. C.: "Speed of visual perception," *United States Naval Medical Bulletin,* 31:150, 1933.
12. Sheard, C.: "Glarometric measurements on ocular photosensitivity," *American Journal of Optometry,* 8:281–9, 1936.
13. Sherman, Dr. E. S.: "Visual requirements for automobile drivers," *Journal Medical Society of New Jersey,* March, 1937, p. 177.
14. Tumarkina, M. A., and Ostrovskaja, M. H.: "Vocational efficiency of one-eyed people," *Viestnik Opht.,* 10: pt. 1, 143, 1937.
15. Van Tuyl, M. C.: "Monocular perception of distance," *American Journal of Psychology,* 49:515–542, 1937.
16. Weymann, M. F.: "Visual requirements for automobile drivers," *California and Western Medicine,* 35:101, 1931.

Organization of Social Forces for Prevention of Blindness*

Audrey M. Hayden

VIGOROUS and persistent action on the part of the Illinois Society for the Prevention of Blindness succeeded in stirring the imagination and the sympathy of the voting public and led to the passage of highly significant sight-saving legislation

SOMEONE has said that no one can hear that two-thirds of all blindness is preventable without experiencing some sort of an emotion. Either it takes the form of astonishment that so little is being done about it, or it assumes the opposite extreme of a burning indignation or divine pity inspiring action—vigorous, persistent, and effective.

Perhaps the reason there is more of astonishment and less of burning indignation is that blindness with all of its fearful implications is not borne in on our consciousness very often.

Two years ago last fall I was in Jacksonville at the Illinois School for the Blind. As I came out of my room to go down to dinner I suddenly heard strains of the most beautiful organ music coming from the auditorium. I went down the hall to see who it was at the organ. I opened the auditorium door, only to be met by blank darkness—but as my eyes became accustomed to the dark I saw that two little boys, about 12 and 14, were at the organ. My first impulse was to turn on the light. And then I realized with a sinking of the heart that it was too late to turn on the light for those two boys.

In that moment, as I realized the dreadful loneliness of the dark, I felt that no work could be too hard, no detail too tedious, no

* Presented at the National Conference of Social Work, Seattle, Washington, on the program of the Committee on Prevention and Social Treatment of Blindness, June 27, 1938, and published in the *Proceedings* of the National Conference of Social Work.

effort too great, if, as a result, we could head off this frightful calamity for other children in our state.

In that little story is the heart beat which keeps prevention of blindness alive, and I am of the firm opinion that it takes just such a strong emotional drive to motivate a program of this kind. No social forces will be mobilized without it—better and more lasting results will be obtained with it and because of it. It will lend urgency to any plan because it will make us feel that the time is short and the task is great. It will fill us with an impatience which will be a spur to progress.

I remember once complaining bitterly to a friend about the slow mental processes of a certain state official who took his own time about a decision which involved eyesight, and she said to me, "Calm yourself—he thinks in decades and you think in minutes." We must all think in minutes where blindness is concerned, since speed on our part may mean all the difference between darkness and light to many individuals.

In mobilizing public opinion for prevention of blindness, just what is our goal?

We cannot rest on our oars until the day dawns when our whole social fabric is permeated with information as to the symptoms of impending eye disasters; how much blindness is preventable; how it is prevented; and where to go to get the best advice.

How do we set the wheels in motion for such an educational program?

Well, if I were asked what was the quickest and most effective manner in which to educate the public on this issue, I should say, without a minute's hesitation, "A strong legislative program." This program, if ably and simply interpreted, first to the legislators and through them to their constituents (or in case of trouble—through the constituents back to the legislators), would, it seems to me, be the best way to dramatize the issue and give it vitality.

What bills should such a program contain?

Possibly four basic pieces of legislation should be included:

(1) An enabling act for sight-saving classes which would provide: (a) an adequate state subsidy; (b) requirements for teachers' training; (c) provisions for transportation so that rural communities could have consolidated classes; and (d) provision for ade-

quate supervision by the State Department of Public Instruction so that standards could be inaugurated and maintained.

(2) A mandatory Silver Nitrate Bill, and by that I mean a statute, not board of health regulation, with no exempting clauses, yet so carefully worded that it does not run counter to medical practice acts which specify that a physician cannot be dictated to in regard to the use of drugs.

(3) A law to provide for the control of trachoma in states where it presents a real public health problem.

(4) A law to limit the sale of fireworks to pyrotechnical experts.

All I know about how such a program is translated from impulse into reality is what I have learned in the "School of Hard Knocks," by actually trying to put sight-saving legislation on the statute books of Illinois; and in the hope that our experience may help other states, I have tried to analyze our failures and successes in such a way that they may be of service.

In placing such a legislative program before a state legislature, I think the least controversial measure should be taken first so that a pleasant acquaintance can be cultivated with the members of the House and Senate. Our School Bill was put through the 1929 session of the legislature with a vote of 135–0 in the House and 41–0 in the Senate. This bill went through on a straight lobby with no community organization and no pressure. Everyone of the 135 men in the House and the 41 men in the Senate who voted for the measure received a personal letter of thanks from the President of the Illinois Society for the Prevention of Blindness. Every time a new sight-saving class was opened in the state they were informed and thanked again. Every time a member of the staff of the Illinois Society went to a town where a legislator lived he was visited and made to feel that he had been responsible for some mighty nice work. In other words, gratitude is a powerful weapon in the mobilization of social forces.

When, two years later, in 1931, we took a bill to the legislature to prevent blindness in newborn babies, even though the bill was controversial, in that it was opposed by a powerful anti-medical lobby, we were in the midst of friends who felt that they were our partners in prevention of blindness.

The bill provided that "every doctor, midwife, or nurse attend-

ing at the birth of a child in the State of Illinois instill or have instilled into the eyes of the baby, within an hour after birth, a one per cent solution of silver nitrate, or some equally effective prophylactic for prevention of blindness from ophthalmia neonatorum, approved by the state department of public health."

This bill was drafted by a constitutional expert. It was flexible in its wording so that it did not run counter to the Medical Practice Act. It named the approved treatment but gave a choice, always providing for approval by the department of health. If a better antiseptic cleanser than one per cent silver nitrate is discovered, our law will not have to be changed.

Almost immediately anti-medical opposition to the bill crystallized. The legislature in 1931 was literally snowed under with letters from our opponents, asking the members of both houses to vote against the bill on the ground that it was an invasion of personal liberty (a very sinister argument to fight, by the way). But with a ten-year record of 1,294 babies in the city of Chicago alone who had been hospitalized by our society, all suffering from an infection which they need never have incurred, and with a memory of 77 other babies who would never see as long as they live because their eyes had not been properly treated at birth, we lobbied the bill through the legislature with a vote of 105–6 in the House and 36–6 in the Senate.

After holding the bill to within 12 hours of the deadline for signature, the attorney general returned the bill to the governor with the opinion that it was unconstitutional, and the governor vetoed it. Because the men in the House had been so thoroughly convinced of the good the bill would have done, they shattered a precedent of 40 years' standing and passed the bill over the governor's veto by a vote of 116–9.

It was necessary to get 34 votes to over-ride the veto in the Senate and all we could muster was 28. One of the senators, a man who was returned by the churches of his district, got to his feet and said, "You gentlemen have been listening to the kind of lobbying in this bill that doesn't get you very far politically."

As I sat in the gallery and listened, I thought how stupid we had been to believe that just because a bill was good, that just because a bill would save human suffering and the taxpayers' money, its

passage was assured. I saw, in that moment, that straight lobbying was not enough on a controversial measure, that educating the legislators was not enough—that the whole state had to be educated so that no representative of the people would dare to make a statement like that again. I saw that we had to demonstrate that a bill which saved helpless babies from a lifetime of darkness was loaded with political dynamite.

I give this background because the story told here furnished us with the ammunition for our future organization, and that is a very important item in mobilizing social forces.

In the midst of our despair we had a gift from heaven. Mr. James Weber Linn, of the *Chicago Daily Times*, heard of the vote and took his pen in hand and wrote a column called "The Pen Sword," which said:

"The governor vetoed the bill to make the treatment of the eyes of newborn babies compulsory. He said the attorney general was not sure that the bill was constitutional, and the fear of any unconstitutional legislation makes the governor shudder.

"Blindness is a sad affliction. The blind cannot rejoice in the changing colors of the sunset or the infinite yet intimate glory of the stars; they cannot perceive the blueness of the sky, though they can feel the chill of rain; they cannot perceive the faces of those they love, and who love them; they must wander always in blackness. But to the governor, no doubt, they suffer under an affliction even worse than any of these: they cannot read the constitution of the State of Illinois.

"It is a wonderful thing to be born without imagination; a wonderful and a comforting thing. No man born without imagination ever loses any sleep thinking of the preventable misery of others. No man born without imagination, even if he is a governor, ever wakes in the dark and wonders what it would be like to know darkness only, darkness to the end, starless darkness stretching universal. No man born without imagination, even if he is a governor, ever thinks of his pen as a poisoned sword with which he may put out thousands of eyes at a stroke. No man born without imagination, even if he is a governor, ever sees himself eclipsing the sun in a thousand skies, building a narrow wall around the hopes of youth, fashioning a nightmare for a child's dream."

As I read those words I thought, if a man who had never seen a case of baby's sore eyes—who had never been near Springfield during all the fight for the bill—could write like that about it, we

weren't defeated yet, and we decided that we would not drop the fight—only next time we would have community organizations and an informed electorate behind us.

Illinois has 51 legislative districts and we decided that we would organize standing committees in each one of those districts, made up of key people who would represent the Legion, the Parent-Teachers Associations, the women's clubs, the churches, the men's service clubs, nursing and medical societies, besides prominent individuals influential with members of the legislature and state officials.

We planned through these key people to educate the groups they represented.

We planned to make the Silver Nitrate Bill a political issue. I am always annoyed by people who say superciliously, "Oh—don't you hate to get mixed up in politics?" My answer is always, "If politics are the tools with which blindness will be prevented, then we wouldn't scorn to use them."

What material did we use for educational purposes?

(1) We went to the League of Women Voters and asked them to include the vote on our bill in their Digest on the ten most important bills of the 1931 session. They did this and we bought up 25,000 copies and marked them for the 51 legislative districts for circularization throughout the state.

(2) We ordered 25,000 copies of the James Weber Linn editorial.

(3) We ordered 25,000 copies of two other editorials that had come out in the *Journal* of the American Medical Association and the *Survey*.

In the fall of 1931 three of us started out and did not stop until December of 1932, when we had completed the organization of a committee of 3,114 members who in turn represented about one and a half million votes. This was slow, painful work. We had from half an hour to one hour's conference with every one of these 3,114 committee members. We made them feel that they were enlisting on a crusade. We made them feel responsibility in their own group. And, believe me, those hours were not wasted.

In the summer of 1931 we took the adverse opinion of the attorney general to the constitutional law department of the University of Chicago and asked them to give it intensive study. If

they considered the opinion sound, we proposed to redraft our bill—if they considered it clearly a prejudiced opinion, we proposed to take the very same bill back to the legislature in 1933.

The attorney general, who had rendered the opinion in 1931, was running for governor on the Republican ticket in the primaries of 1932. In January of 1932, Professor Puttkammer, of the University of Chicago, called us up and told us that, after exhaustive study, the constitutional law department had decided that the opinion did not hold water and that they had decided to publish a two-page editorial in the *Illinois Law Review* for February, analyzing the opinion and showing up its legal weaknesses. Since the attorney general was opening up his Chicago campaign headquarters on March 1, we prevailed upon the University of Chicago to hold up the editorial until the March 1 issue. Then we called in all the metropolitan dailies and gave them the story. The story was so good that it made the front page of all the papers. We wrote and thanked the papers for the news items and asked if they could find it in their hearts to give us an editorial. Three of them did! We immediately circularized all three editorials to our 3,114 committee members. Needless to say, this publicity at primary time cooked several political geese, among them the attorney general who was running for governor. The *Chicago Tribune* ran an editorial called, "Little Drops of Silver Nitrate," which pointed out that the former governor and attorney general had thought that the Silver Nitrate Bill had no political significance and now, too late, they had awakened to the fact that the bill was full of political gun powder.

The use of news items and editorials in arousing public opinion is effective only if the stories are dramatic and the interpretation is accurate, and if they are circularized intelligently.

Along with our campaign to organize the standing committees we ran a public speaking campaign all over the state. In that year and a half over 400 talks were given, telling just what happened in 1931. At each talk the speaker would give the vote in the particular district in which she was speaking and make a plea for those present to write letters to their legislators, either thanking them for a positive vote or asking why they had voted against the bill. I believe that the ordinary voter has no idea what a power he wields, and

in mobilizing social forces that power can well be made clearer to the electorate.

Before the elections, campaign promises were obtained from those who were running for governor. The men who were running for attorney general were visited by prominent individuals and were told the whole story of the Silver Nitrate Bill. The editorial in the *Illinois Law Review* was brought to the attention of the men who were running for the latter office.

And so we went back to the legislature of 1933 with the same bill—but behind it this time was the weight of newspaper publicity which had been intelligently directed and circularized; a standing committee of 3,114 people, all excited about the issue and anxious to do their bit in molding public opinion. All these committee members had been furnished with facts in simple form so that their work would be a potent factor and not just a waste of breath.

And it paid. One member of the legislature asked me one day if I had the country roads patrolled at nights to get votes for the bill, and when I asked her what she meant, she said that the previous week the lights on her car had gone out on a lonesome county road at 10:30 at night. The friend who was with her stopped a passing car and asked the driver to tow them into Downers Grove, ten miles away. The man said, "Oh, so that's Mrs. O'Neill, is it? Well, I want to talk to her." He came over to Mrs. O'Neill's car and said, "Mrs. O'Neill, I'm Dr. Jones from Naperville. I'm the head of the DuPage County Medical Society, and before I tow you into Downers Grove I want to know what you are going to do about the Silver Nitrate Bill." We hear a lot these days about community organization. There is a museum example of it.

The bill passed the House by a vote of 109–6 and the Senate, 38–2. The attorney general ruled that it was constitutional, and the governor, who was subjected to heavy pressure against the bill, signed it on the eighteenth day of April, 1933, and it became the law of Illinois on July 1 of that year.

There is no gainsaying the practical results of mobilizing public opinion for a legislative program of this kind. Before our School Bill became a law there were 10 sight-saving classes, poorly equipped and manned with untrained teachers, limited to the city of Chicago. Since the law became effective in 1929, we have opened 66 sight-

saving classes in 25 cities and the appropriations have grown from $26,000 to $283,600.

Before the Silver Nitrate Bill became effective in 1933, we used to have from 8 to 12 babies a year blinded from ophthalmia. Since the law became effective five years ago this July we have had two blind babies.

Before the Trachoma Law was passed in 1935, we had no diagnosis and no treatment except at the Illinois Eye and Ear Infirmary in Chicago, situated 400 miles away from the trachoma district in Southern Illinois. We now have 3,000 positive trachoma cases under treatment and 1,000 suspects under observation in five trachoma clinics in Southern Illinois.

A long time program like this yields mounting dividends. The members of the legislature respect the efforts of an organization which keeps at it until the last bell rings. The imagination and sympathy of the general public are stirred into action which, as was said in the beginning, is vigorous, persistent, and effective.

What Social Workers Should Know About Preventable Causes of Blindness*

Eleanor Lee Hearon

SELECTING four of the most common causes of blindness—trachoma, glaucoma, ophthalmia neonatorum, and interstitial keratitis—the author discusses the symptoms and treatment from both the medical and the social service viewpoints

TWO important factors in eye care are skilled service and its accessibility to the patient. Social workers constantly speak of the necessity of utilization of proper resources, which implies not only the knowledge of resources but a discriminating use of them.

Definitions of Ophthalmologist, Optometrist, and Optician

It might be well to define some terms which are confusing to many of us, perhaps because they all begin with the letter, "o." Ophthalmology is the science of the study of the eye. An ophthalmologist is an eye physician who is a graduate medical doctor, who has served his interneship and, in addition, has had at least two years of specialization in the eye, the study of anatomy, physiology, chemistry, pathology of the eye, etc., and experience in the diagnosis and treatment of eye diseases and testing of eyes for glasses. Recently the term "eye physician" has been used and this name itself implies basic medical training and experience, plus specialization in the eye, and is synonymous with the word ophthalmologist. Oculist is synonymous with ophthalmologist, and is of more common usage among lay persons.

* Excerpt of paper given at the National Conference of Social Work, Seattle, Washington, on the program of the Committee on Prevention and Social Treatment of Blindness, June 27, 1938.

An optometrist is a person who grinds lenses, tests the eye for glasses, and sells glasses. An optician is a person who grinds lenses prescribed by the physician, and sells glasses.

The latter two have not had medical training, and hence are not equipped to handle diseases of the eye.

Skilled care, then, means an examination by an ophthalmologist or oculist.

Accessibility of eye physicians is a problem in western states, or in states predominantly rural. In Colorado, for example, there are 63 counties covering an area of 103,658 square miles and there are ophthalmologists in only ten counties comprising an area of 14,296 square miles, that is, 13 per cent of the state has an ophthalmologist available. Each state must work out its own problems of providing adequate eye care, and will probably find, as in Colorado, that ophthalmologists, as individuals, and as members of a state society, are interested in conservation of vision and prevention of blindness and will participate in making eye care of a skilled nature more widely available.

Definition of Blindness

The Social Security Act has done much toward establishing a uniform definition of blindness, and in setting standards for qualified doctors to examine for blind benefits. However, it is important for social workers to have an understanding of the definition of blindness, determination of the degree of vision, and qualifications of ophthalmologists.

Before going on to a discussion of some of the diseases which present potential hazards to vision, it would be well to explain the definition of vision. An accurate measurement of vision is the first step in an eye examination. We are all familiar with vision charts used in schools, by automobile licensing bureaus, and by all doctors for the testing of vision. The most commonly used one is the Snellen chart. This sets up an arbitrary standard for measurement of what the eye sees at a distance of twenty feet. The letters or figures are drawn to scale, so that if a person can read only the large letters at the top it means he can see at twenty feet only what he should be able to see at two hundred feet. This would be written as 20/200. The American Medical Association drew up a standard

classification of vision in terms of per cent of loss of visual efficiency. Their table indicates that 20/200 is equivalent to 20 per cent visual efficiency. But this applies only to things looked at directly and not to the perception of many objects that we can be aware of in other parts of the field of vision.

When a person is unable to read the chart, then there are methods for less precise measurements. The next device that is used in testing the patient is to see if he can count the fingers held before his eyes and at what distance he can distinguish them. Hand motion is then tried—that is, can the patient see the hand which is moved in front of his eyes? Motion helps in perceiving things that are not looked at directly. Light perception and projection come next. Can the patient tell light from darkness; and, if he can distinguish light, can he perceive and point to the direction from which the light is thrown?

In addition to the degree, there is the type of vision, near and distant, which depends on the using of "accommodation of the eye"; and central and peripheral, which depends on direction of the thing seen. For example, in central vision the seeing portion of the eye used is the macula. This particular portion of the retina is used for critical seeing such as is needed in reading, writing, etc. The peripheral vision comes from the outer portions of the retina which allows us to see at the side. This is of great help in orientation, and in observing objects approaching from the sides. It can readily be understood that good peripheral vision is essential for safe automobile driving.

We know too little of what the patient can actually do with the various gradations of vision. Although this depends on the individual patient, yet in general it would be helpful if we knew what could or could not be expected of persons with a certain amount of vision as shown by our tests.

This is not to be a medical discussion, for that is in the province of an eye physician. However, in speaking of some of the diseases which are potential dangers of vision, a brief explanation will be given of the medical conditions which will include something of the tests necessary for diagnosis, the usual type of treatment and possibilities for prevention, as well as the significance of these to the patient and his family.

Some Common Causes of Blindness

For discussion we shall select four eye diseases which are somewhat familiar to the lay person and are common causes of blindness. We shall consider trachoma, glaucoma, ophthalmia neonatorum, and interstitial keratitis.

Trachoma.—Trachoma, "granulated eyelids," is one of the most preventable causes of blindness. Dr. Harry Gradle states that it is utterly inexcusable that any one with trachoma lose his vision. The specific cause is unknown, but the results are well known, and the infectiousness of the condition is understood. The inner lining of the eyelids becomes roughened and furrowed, and this irritates the cornea. On the cornea itself a sheaf of blood vessels appears. They seem to start from above and gradually grow down and cover it like a curtain. When these vessels invade the pupillary area, they obscure vision, and this effect can never be removed. Treatment for trachoma is usually the irrigation of the eyelids, scraping the follicles, or roughened surfaces, applying copper sulphate, and sometimes surgery, to eradicate the roughened areas. Whichever treatment is used, it is very painful to the patient. The copper sulphate, when applied to the reddened and inflamed tender lining of the lids, is a severe treatment. It also requires time, covering months, and in the early stage may be needed daily. The patient, in addition to having an understanding of the condition, and the necessity for care for this type of treatment, must also be taught precautionary measures, personal hygiene, cleanliness, etc. The family can best help the patient if they have an idea of what the patient is going through, and of the precautions for preventing the spread of the disease to other members of the family. We have only to hear that some people living in the Ozarks have been known to infect purposely the eyes of their children in order that when they grow up they will be eligible for blind pensions, to realize the importance of public education. Although the incidence of this disease has been lowered through public health measures, etc., it will only be through vigilance of both the social workers and the doctors and agencies interested in public health and welfare, that trachoma can be eradicated as a cause of blindness.

Glaucoma.—Glaucoma is estimated by Dr. Gradle on the basis of the 1928 census to be the cause of 5.4 per cent of blindness. Dr.

Edward Jackson has stated that it has been the cause of 12 per cent of hopeless blindness. This disease merits careful consideration. Because of the similarity of names, these two diseases, trachoma and glaucoma, are often confused. Glaucoma does not affect the same portion of the eye, but is a disease of the interior structures of the eye. Its cause is unknown. For some reason the small drainage canal of the eye becomes clogged. The fluid in the eye continues to be secreted; and as a result there is an increase in pressure within this area. The effect is similar to that of too much air in a football. As there is no room for expansion there is pressure exerted against the most delicate tissues of the eye—the rods and the cones of the retina—which damages them often beyond repair.

There are, in general, two types of glaucoma, acute and chronic. The acute type is known by extreme pain, and redness of the area just around the iris. Early treatment is most vital and the severity of the symptoms usually results in the patient's going to a doctor. Here again, the question of skilled care is important, for early diagnosis and immediate treatment are vital. The pain sometimes does not seem to be referable to the eye—there may be a severe headache, nausea, etc. Not long ago a patient came into the clinic after hours, moaning and holding her hand to her stomach. A short medical examination did not show any apparent abdominal difficulty and she was advised to return later for a more thorough check-up. The patient refused to go and continued to sit on the bench and groan. She spoke English brokenly and her husband was even more difficult to understand. He was adamant and would only say that he brought the "old lady" to the hospital because she was sick, and wasn't going to take her one hundred and fifty miles home. The patient was referred to Social Service to explain clinic procedure and schedules and to make a return appointment. The social worker learned that the patient was nauseated, and that her head hurt just as it did once a long time before when she lost the sight in one of her eyes. The ophthalmologist found that the patient had a high ocular tension and an acute attack of glaucoma in her one useful eye. She was immediately hospitalized. The ophthalmologists believe that the education of the general medical doctors about glaucoma is important. It is well known that nerv-

ousness, emotional upsets, fright, etc., will affect the pressure of the eye. In some cases emotional upsets have seemed to be the precipitating cause of the attack. Worry can definitely be seen to affect the tension and increase the pressure. A person with this disease should be as free as possible from worry and lead as emotionally calm a life as he can.

The chronic variety of glaucoma is insidious because of the absence of pain, redness of the eye, etc. There is little or nothing on the outside to call attention to the difficulty. There is gradual loss of vision, so gradual that even the patient is unaware of it. Perhaps one day he may cover one eye and be surprised to learn that he cannot see so well out of the other. Patients occasionally give this story.

An eye examination, by an eye physician, will usually detect any tendency to this disease. Since it usually occurs in persons of middle age or over, annual eye examinations for persons in this age group would be a measure of prevention.

If glaucoma is suspected, the amount of pressure is measured by a special instrument and fields of vision are taken. We cannot go into these tests except to say that in each case the patient must co-operate completely if the tests are to be of any value. In the field examinations the necessity of mental concentration means a certain amount of strain and nervous tension for the patient.

There are two kinds of treatment: the use of drops to contract the pupil, and surgery. Both are directed toward lowering the pressure within the eyeball. After a diagnosis is made, treatment may mean constant medication and periodic observations by an ophthalmologist for the rest of the patient's life.

It is the treatment of the chronic type which presents the most serious problem. We often hear the expression, "What we cannot see and do not hear will not hurt us," and this seems to be applicable to our attitude toward patients with this condition. It is difficult for the patient to accept the fact that there is anything very seriously wrong if he has no complaints and no apparent eye trouble, and to feel the need for treatment either by drops or surgery. The drops blur and smart after instillation and may interfere with vision for some time. A common reaction is, "My sight is so much worse than before." Doctors and social workers who deal

with the patient in clinic attempt to explain why this is and to explain to the patient that it will happen. If the social worker who sees these patients can interpret this also to the patient, he may be encouraged to remain under treatment.

Another thing which occurs in glaucoma is that the peripheral vision is contracted or cut down and this, when there is a marked reduction, seriously interferes with the patient's ability to get about. The central vision also is reduced and many patients lose their sense for fine distinction, as vision becomes blurry and foggy.

What do these effects of glaucoma mean in relation to the patient? The nature of the treatment means frequent medical examinations and long drawn out tests, which in turn may take time away from work and mean a cost for transportation, either of which is difficult for him to arrange. The condition itself presents certain limitations or restrictions. Reduction of vision, both central and peripheral, will affect the patient's capacity to get about safely; will influence his employability in certain types of jobs; and, if the vision is much reduced, will affect his working capacity. We are well aware of the social implications for the individual and his family when a wage earner's ability to work is threatened. Disruption of work, loss of income, fear of loss of vision, the prospect of long continued treatment in the attempt to retain the amount of vision he has, with no hope for any improvement, make it difficult for a patient to avoid worry. With the psychological and physiological interplay in this condition the patient seems to be caught in the midst of a vicious circle. He needs the understanding and help of everyone to whom he brings his problems, so that he can face the situation, be able or enabled to accept the responsibility for his own treatment, and modify his manner of life to meet the restriction this disease may impose upon him.

As social workers we are better able to work with individuals with glaucoma, if we too know about the condition and its medical-social implications.

Ophthalmia Neonatorum.—Ophthalmia neonatorum, "babies' sore eyes," characterized by a virulent infection and discharge of quantities of pus, which appears soon after birth, is, in many cases, caused by gonorrheal infection. Unless treated, this condition will usually result in blindness, from the scarring of the cornea; and in

some extreme cases there will be a perforation of the cornea, or the infection may spread into the inner portions of the eye. Immediate examination is indicated and, when diagnosis is established, treatment consisting of irrigation of the eyes and certain medications is initiated. Prompt action is necessary. Prevention of this disease is almost one hundred per cent perfect if silver nitrate or some other preventive is put in babies' eyes at birth. If smear examinations are part of prenatal care and when the organism is present the mother is treated, and if precautions are taken at the time of birth, there is practically no danger of infecting the eyes of the child.

Interstitial Keratitis

Social workers in hospitals are aware of the emotional reactions of mothers when they learn of their children's condition and the cause; of the threat to the marriage of the parents; of the feelings of guilt and, in some cases, the over-protectiveness toward the child, which thwart normal parent-child and family relationships. Dr. Conrad Berens estimates that at least 15 per cent of blindness is the result of syphilis. No part of the eye is exempt from this disease. We shall mention only one of its forms.

Interstitial keratitis, usually a congenital condition, is an inflammation of the cornea which arises years later, from syphilis, and which, if the luetic condition is untreated, may lead to a scarred cornea and blindness. Holloway estimated that 75 per cent of all congenital syphilitics sooner or later show some ocular evidence of syphilis. It is urgent that this group be under medical observation and receive anti-luetic therapy. Routine Wassermanns for all expectant mothers, and treatment when indicated, will practically prevent congenital syphilis, and congenital eye conditions of a syphilitic origin. In addition to the social implications with which we are familiar in syphilis, there are others which are common. It is difficult for patients to see the correlation between the blood condition and the eye condition. When a loss of vision is threatened or occurs we sometimes find marked emotional reactions on the part of parents who consider themselves to blame for the child's condition.

The present outspoken campaign does much in eradicating the stigma and the feeling of shame about this disease, and will result

in individuals being better informed about the disease, and its treatment.

Medical and Social Aspects of Blindness Prevention

The preventable causes of blindness are of both a medical and a social nature. Some can be approached only through social action directed toward eradicating unhygienic living conditions, inadequate food, and other adverse social conditions, improving industrial hygiene, extending public health measures affecting communicable diseases, licensing of doctors, midwives, etc. Others can be approached through meeting the individual and his needs on a case work basis. This entails a knowledge of the patient, his background, family, present situation, his medical condition, which may be a potential hazard to vision: and his attitude toward this and the other social implications of the diagnosis, treatment and prevention of this condition. Social workers, then, should know the various causative factors of preventable blindness, so that they may, both through their treatment of the individual and their leadership in community planning, take part in the basic treatment of the blind—the prevention of blindness.

Bibliography

1. Berens, Dr. Conrad: "What Can An Organization for the Blind Do in Prevention of Blindness?" *Sight-Saving Review*, 3:186–203, September, 1933.
2. Best, Harry: *Blindness and the Blind in the United States*. New York: Macmillan, 1934.
3. Gradle, Dr. Harry: "Prevention of Blindness." *Bulletin* of the Kansas City Southwestern Clinical Society, March, 1936.
4. Holloway, Dr. Thomas B.: "Why Have Ocular Disasters?" *American Health Congress Series*, 4:1–82, May 17–22, 1936.
5. Jackson, Dr. Edward: "Glaucoma," *Hygeia*, 4:523, September, 1926.

Syphilis in Eye Clinics

Robert R. M. McLaughlin, M.D.

FOR maximum efficiency all eye clinics should provide routine Wassermann blood tests for each patient; maintain social service departments; and use uniform methods of recording

A RECENT survey of eye clinics in New York City, undertaken as a part of a study of specialty clinics in regard to the question of syphilis, showed us that syphilis is being inadequately considered in eye clinics generally. This conclusion is based on collected facts provided by the clinic physicians, social workers, and nurses as to the prevalence of syphilis in each clinic; the methods that are used to detect its presence, as well as the means available for the treatment of the disease once its presence is uncovered. When these figures fail to agree with accepted methods and figures collected through all other available means, we feel justified in drawing such a conclusion.

The problem is large and involves such factors as: (1) education of the general public to permit the drawing of blood for the necessary tests as a routine matter; (2) inducing physicians in all fields of medicine, including the specialists, to become "syphilis-minded"; (3) providing adequate and easily accessible treatment in all cases and for all classes of people, regardless of cost.

The amount of syphilis in eye patients has been placed at figures varying from 2.1 per cent to 34.3 per cent, depending a great deal on the locality of the surveys and studies. Routine Wassermann tests on 811 new admissions to the Lighthouse Clinic in New York City during 1937 produced 34, or 4.1 per cent, positives. In the preceding years it was not thought necessary to have a syphilis clinic associated with the eye service because it was believed that there would not be enough patients to warrant it. Needless to say, this clinic is now established and growing.

The amount of eye syphilis seen in syphilis patients is a higher figure. Stokes estimates that between 25 and 35 per cent of persons who have syphilis will show eye lesions in the course of the disease if it is of the acquired type. Of the congenital cases of syphilis, he estimated a 78 per cent incidence at some time before the age of thirty years. He further reported that only 66 per cent of these cases showed a positive blood Wassermann reaction. This fact must be remembered in estimating the incidence of syphilis by means of a routine blood test in any group—sero-negative but clinically active syphilis, detectable by careful history taking, physical examinations, and intelligent social service work.

Routine Blood Test for All Eye Patients

While it is true that a routine blood Wassermann test will not uncover all cases of syphilis, it is likewise true that when a routine test is not performed, many more cases of syphilis remain undiagnosed, especially when the physician does not constantly keep it in mind as a possible cause of the disability presented. Berens and Goldberg reported positive Wassermann reactions in large percentages of certain eye disabilities in their study of 100,000 eye cases in New York City clinics and hospitals. Interstitial keratitis showed 53.8 per cent and kerato-iritis 50.0 per cent positive Wassermann reactions. It is impossible to state in how many more cases the patient was sero-negative, but according to Stokes' figures, these percentages represent only 66 per cent of the actual cases due to syphilis. These are conditions in which it is the duty of the attending physician to first exclude syphilis as an etiological factor before he even considers other causes. There are still other conditions, such as Argyll-Robertson pupil, optic neuritis and papillitis, iritis and iridocyclitis, uveitis and choroiditis, where syphilis must be ruled out as the most likely or else a very probable cause of the trouble.

A routine blood test should be seriously considered by all eye clinics. Preferably, the cost of such a test should be included in the admission charges to the patient. It is often possible to have the test done by the local or state health department without cost to the patient or clinic. After admitting that the dependability of the tests varies widely, that false positive tests will be obtained in

a small percentage of cases, and further that false negatives will be encountered, there is no better method available for diagnostic studies of large groups of persons. The responsibility for failure to provide such service rests squarely on the shoulders of the medical and governing boards of clinics or hospitals offering medical service of any sort to the paying or even the non-paying public.

It is questionable whether routine physical examinations have the value of routine blood tests for syphilis. It cannot be surpassed as a business-making policy in pay or private clinics. In free and city dispensaries, it provides much additional and occasionally unnecessary labor for the clinic physicians—usually overworked. In certain categories of eye conditions, perhaps such a group as mentioned above, routine physical examinations should be performed in addition to a serologic test. If this examination is deferred until a positive blood test is reported, one is satisfied to treat only two-thirds of their syphilis patients. Other contributory or etiologically important systemic diseases than syphilis may be uncovered. It cannot be expected that the eye specialist is capable of doing a satisfactory physical examination, or that he would have the time to do so. This service should be available in the same out-patient department and should be done by competent internists.

Need for Social Service Department in Eye Clinic

Another important and often neglected feature of an eye clinic is a well-trained and adequate social service department. Especially trained social workers for eye patients are desirable in every eye clinic, as the work is peculiar to the field. Either additional training in syphilis work, or an additional trained worker in syphilis, preferably the former, is needed in the vast majority of clinics. Probably the physicians themselves are responsible for the lack of adequate social service workers in many instances. Unfortunately, there has been undue friction in the past, due to the manner in which social service work has been introduced to the physician. Much of the misunderstanding has disappeared as the more exact sphere of action for the social worker has been defined.

One great fault found in eye clinics has been the lack of adequate anti-syphilitic treatment facilities in the same clinic or out-patient

department. Only recently have the larger eye clinics undertaken to supply this service. The development of a moderately active syphilis clinic at the relatively small Lighthouse Clinic (25 patients receiving anti-syphilitic treatment) in the course of one year demonstrates what may be expected. There is no factual basis for the opinion that the eye clinic alone would not supply a sufficient number of syphilis cases to warrant the establishment of such a clinic. Treatment of these cases by referring them to another hospital or clinic usually results in the loss of the patient by the eye clinic or inadequate or no treatment for the syphilis. It is entirely unsatisfactory and is actually impractical to follow up these patients adequately by one or even both clinics.

Finally, it was found that too often there was not a great deal of effective co-operation between clinics in the same out-patient department unless there was a unit record system. It is not possible to conduct all services at the same time of day or on the same days during the week so that personal consultation between physicians regarding each patient common to the involved services can be arranged conveniently. Furthermore, a written opinion provides a permanent record even if not so complete or so exhaustive as a personal consultation.

Summary

For maximum efficiency, all eye clinics should: (1) provide routine Wassermann blood tests for each patient; (2) maintain social service departments; and (3) use uniform method of recording, preferably a unit.

Possibilities for Prevention of Blindness in the Public Assistance Program *

Eleanor Brown Merrill

ONLY with trained and experienced personnel on all fronts—among public assistance workers, prevention of blindness workers, and health officers and nurses—can we look for united action in the campaign against blindness

WE see in the program of the Social Security Board the broad implication of public assistance as it relates to all public and voluntary welfare development. In considering specifically services for the blind, one cannot fail to recognize the significance of these services from the standpoint of prevention, and to be aware of the many avenues into which a program such as has been discussed may lead in accomplishing the final results which all of us desire, namely, the elimination of needless blindness.

Throughout this whole conference there is evident the social worker's concept of a specialized service to the community as dovetailed into the general pattern of a complete and all-embracing program—though calling, as it may, for the employment of special techniques. Just as in case work, we now consider the client as a whole individual and not simply with a view to his particular and separate complaints, so we have progressed to a consideration of the community as a whole, with its various needs, shortcomings, opportunities, and developments, studied in relation one to another. Our goal is a thoroughly integrated, comprehensive community relationship.

Miss Harper brought this point out forcibly on Tuesday, when

* Discussion following "Fitting Special Services into the Public Assistance Pattern," presented by Miss Jane Hoey, Director of Public Assistance, Social Security Board, at the National Conference of Social Work, Seattle, Washington, on the program of the Committee on Prevention and Social Treatment of Blindness, July 1, 1938.

she discussed an integrated program for the blind in relation to public and private activities. In all of the presentations relating to social treatment and prevention of blindness integration has been stressed, with more or less insistence on stimulating in each of the agencies concerned the full assumption of its particular responsibility.

It is inevitable that in working towards the objective of a decreasing need for financial aid, the Social Security Board, through its Division of Public Assistance, must lay emphasis on preventing conditions which lead to disability and dependence. Aid to the blind as administered in many of our states has opportunity to restore sight and conserve vision to an extent that we have, perhaps, been slow to recognize.

In looking through a document recently issued by the Bureau of Public Assistance—"Characteristics of State Plans for Aid to the Blind," December 1, 1937—it is interesting to note certain points and to consider these in relation to the administrative set-up in those 37 states and one territory listed. The definition of blindness used in determining eligibility for assistance agrees in most instances with that recommended by the Social Security Board. A maximum of 20/200 in the better eye after correction is used as the measuring point, with limitation of fields as a qualifying factor; only five have fixed a definite value to the contracted visual fields in determining vision loss. The terminology of these state plans differs, but the majority require examination by a medical practitioner skilled in diseases of the eye, and the value of this provision cannot be overestimated. Though still in the stage of development and experimentation, state plans for assistance to the blind promise much in the way of restored vision for individual cases, determination of causes which will allow for eradication of contributing factors, location and following up of patients who without this service might later be added to the blind population.

A few state plans specify that assistance will be denied or discontinued if the applicant refuses operative treatment which the ophthalmologist certifies will result in partial or entire restoration of eyesight; the applicant may this become ineligible for any form of public relief. There is ground for difference of opinion in regard to such enforcement; the responsibility of insisting upon surgical

measures in view of what must always be an uncertainty as to outcome is greater than many of us would like to assume. On the other hand, we realize that because of inertia, fear, unwillingness to face a possible change in the order of living or for other reasons, many applicants for assistance are averse to sustained medical care and a special prod such as this may secure the desired co-operation. It seems wise for each case to be considered on its individual merit and the department's discretion used in deciding whether or not to withhold aid on this basis.

An added argument, is it not, for good case work services? Without an understanding of the client's attitude, of the conflicts and possible sense of failure which have contributed to a complex situation; without realizing the natural fears of surgery and its results, the public assistance worker would be very limited in her resourcefulness.

I was interested, in talking recently with the medical social worker on a city welfare department staff dealing with blind assistance, to learn of the plan she had adopted in regard to applicants recommended for cataract operation. Whenever an investigator finds such applicant resistant to the idea, she advises him to come to the general office and talk with the medical social worker, who then discusses the matter from her own knowledge and experience, clarifying the patient's mind as to the reason for such recommendation, the factors involved, and the probable beneficial result. If the patient with this fuller understanding is then willing to reconsider, he is referred back to the doctor or hospital with word to that effect and has another and fairer opportunity to decide what his action shall be. For interpretative service such as this, however, special preparation is needed, since the medical social worker must thoroughly understand the diagnosis and the various factors involved. Not handling case work herself, she must none the less be versed in its processes and techniques, and must be able to correctly steer her clients to the proper sources. Hers may be the function largely of technical consultant—to client, to division staff, to family and relief workers, to the department in helping to determine policies, to the community in interpreting public health and welfare needs.

Let me be more specific as to the kind of problems that come

to the attention of a medical social eye worker in a public assistance division. A family of eight is under consideration, with the forty-four-year-old mother and four children certified as blind from a congenital condition; two of the other three children have impaired vision. Can something be done to improve the vision of these two children, or at least to prevent further impairment, and can the normally sighted child be safeguarded against damage? Will intelligent, understanding guidance prevent further incidence of blindness in the family?

A man certified as blind from trachoma can be given sight (20/50 in one eye, 20/40 in the other) with the use of contact lenses, though only for two hours a day, as the eyes could not stand more continuous correction. Can the lenses be provided as a help to this man's morale, yet with the realization that two sighted hours a day cannot remove him from the need of blind assistance? What about the sixty-three-year-old man with lowered vision? The doctor says glasses can prevent future blindness, but as he is not now eligible for relief, either economically or because of his eye condition, who will interpret the situation to his family and secure their necessary co-operation?

A statement made in March, 1938, by Dr. C. E. Rice, Consultant on Blindness to the Social Security Board, gave the amount of $1,100,000 a month as being paid to 43,700 needy blind persons in 36 states and territories. No guess can be made as to how far these figures may be reduced through restorative measures, but the next few years may show some interesting data. According to the National Society's latest count, 31 states, Hawaii, and the District of Columbia have either supervising ophthalmologists, medical advisory committees, or both, taking part in blind assistance and helping to plan the division's program. Is not this encouraging to all of us interested in sight conservation?

We have recently been in rather close touch with developments in several states where, until the creation of a blind assistance program, no general movement to prevent blindness had been undertaken. I should like here to mention what is happening in two or three instances.

A State Department of Public Assistance, enabled by provisions under the Public Welfare Law to carry a program for adult physical

rehabilitation, secured appointment by the State Medical Association of an advisory and a special technical committee to pass on applications from physicians skilled in diseases of the eye. Doctors accepted are classified into three groups as qualified for major surgery, slight surgery and treatment, or refraction only. In these three classifications the physicians (numbering 49 at present and located in 23 counties of the state) are qualified for restorative and preventive work. Applicants for blind aid are referred by their county department of public assistance to the nearest acceptable eye physician for examination—the expense of such and of transportation to be paid by the county department. A fee schedule has been established for hospitalization, clinic and office visits and for surgical treatment in relation to the seriousness of the operation, and physicians are paid according to services rendered. Examination fees are paid when no operation is called for; otherwise they are included in the operative fee as scheduled. In addition, funds are made available for refraction, glasses, and such laboratory and other tests as may be indicated. A supervising ophthalmologist is studying the findings, and the standard form of eye record and cause classification, as recommended by the Committee on Statistics of the Blind, is in use.

Similar procedures are, we know, in effect elsewhere. I have given one example as typifying a method through which eye conditions amenable to treatment will be adequately diagnosed and treated; and through which accurate data are being accumulated to furnish the basis for preventive activities.

In one state a newly formed welfare department is engaged through its division of public assistance in securing adequate examinations and follow-up care for its blind applicants. A division for the blind, established under the same department, appointed a medical social worker whose duty, after a four-months' period of special training, is to initiate and develop a prevention of blindness program. With the close proximity of these two divisions, the medical social eye worker can serve in a consultant capacity for the blind assistance staff and assume direct responsibility for those applicants ineligible for assistance yet potentially blind unless proper attention can be assured.

As prevention of blindness worker and with the counsel of an

ophthalmological advisory committee, she is at the same time laying the groundwork for a long-time program that will, it is thought, secure the support and co-operation of the various related agencies and of the public. Data on the incidence of ophthalmia neonatorum are available to her from the State Department of Health; she will follow up these cases, not only with a view to making sure of all possible precautions, but in order also to secure full information to serve as a talking point in obtaining more effective legislation than at present exists. Further lines of co-operation between the preventive program in this state and the public health program are through the organization of eye health examinations in rural clinics, and the development of a procedure whereby county health officials will report the names of children found in school examinations as having visual acuity of 20/70 or less. This latter plan is with a view to bringing about the establishment of sight-saving classes as needed. The medical social worker is following up other opportunities through conferences with school officials, participation in the state college summer sessions and in the school of social work curriculum, and through talks before various civic and volunteer groups. Through her, arrangement has been made with the School for the Blind whereby corrective care is being provided for 18 pupils, several of whom are expected to enter regular grammar school next fall.

So new an undertaking as the one just mentioned can but suggest a few of the activities which must be included in a state prevention program. I am glad to say that some state agencies for the blind and societies for the prevention of blindness have gone much, much further than this in their endeavors, and there are many who can tell of splendid developments and accomplishments over the years. Again I have cited one example of what may come into a state—until now apparently unaware of the lack of its health and welfare provisions—through the stimulus of an assistance program and the focusing of attention on a problem which, to some extent at least, is possible of solution.

But I shall return to a point brought out in the early part of my discussion, and that is the necessity for qualified personnel if sound foundations are to be laid and a clear course followed to the desired goal. Without knowing the significance of eye diagnoses, their pos-

sible complications and effect upon an individual, how can the public assistance worker meet her responsibility in bringing about a proper acceptance and follow-through of the recommendations made? Without a case work philosophy, how can the prevention of blindness worker bring to her program that individualized yet broad concept that will result in the building of independence, rather than in the breaking down of morale; or without a comprehension of agency relationships, how can she guide the community to full participation in an integrated program? How can the schools, the health officers and nurses, the social workers, take their part in saving sight without a realization of those factors which must contribute to the possession of good eye health?

To quote Miss Hoey at the National Conference of Social Work in Indianapolis: "We must see that adequate service as well as assistance is given, and this can be done only when trained and experienced personnel are employed by both state and local agencies." With trained and experienced personnel on all fronts, we may look for united action that will get us far in our campaign to prevent blindness.

Pictorial Preview

"The Nurse's Responsibility in Saving Sight"—A New Talking Slide Film

RECOGNIZING that every nurse has countless opportunities to help conserve eyesight—in hospital, home, school, and industry—the National Society for the Prevention of Blindness presents a talking slide film entitled "The Nurse's Responsibility in Saving Sight." Emphasis is placed throughout upon the close integration of the eye health program with the general health activities common to all fields of nursing. The health of the eye is presented from prenatal life to old age.

As an educational device the talking slide film* has many advantages. "The Nurse's Responsibility in Saving Sight" consists of 120 still pictures on a film strip synchronized with a double-faced record carrying a lecture addressed to nurses. As the film strip and record are completely separate, they may be interrupted at any point to permit discussion—thus giving the advantages of a series of slides with the addition of a lecture in the form of a phonographic narrative. Running time is 30 minutes.

Approved by a committee of ophthalmologists, nurses, and staff members of the Society, the complete production—film and record—can be purchased from the National Society for the Prevention of Blindness at $5.00, plus transportation. It is also available for rent at $2.25 per week, plus transportation costs.

* The talking slide film requires a talking slide film projector, of which there are several makes. In many localities, projectors may be borrowed from automobile dealers or other business firms if purchase is not feasible. The talking slide film is not a moving picture and cannot be shown on a motion picture projector. Further information may be secured from the National Society for the Prevention of Blindness, Inc., 50 West 50th Street, New York, N. Y.

"Since many of the causes of blindness have their origins long before birth, early and adequate prenatal care is our goal for *every* prospective mother."

"The silver solution must get into the eye *immediately* after birth; the lids must be properly retracted so that the prophylactic agent gets *under* the lids and bathes the cornea and conjunctiva; and lastly, it must remain in the eye long enough to be effective."

"Careful preparation for the vision test is necessary. The location for the chart should be selected so that the chart will be free from *glare* and *shadows*. To be accurate, the distance at which the test is made should be *exactly twenty feet.*"

"Changes in the normal field of vision are so characteristic of various conditions that a study of visual fields by means of the perimeter is an important step in diagnosis."

Editorials

. . . Each for the joy of the working, and each in his separate star . . .
—Kipling

George Edmund de Schweinitz, 1858–1938

THERE are certain persons who are irreplaceable in the activities with which they are associated. Such a man was George Edmund de Schweinitz.

For the part that he was destined to play in life he was singularly gifted. He was tall, slightly built, with light hair and clear blue eyes, kindly but penetrating; when he spoke his face lighted up as if illuminated by an inner flame, and his voice, which never needed to be raised in order that it might carry to the farthest hearer, had a peculiarly agreeable quality. His poise and his personality made him an outstanding figure in any group of men.

Dr. de Schweinitz derived from a most distinguished ancestry. His father, a bishop in the Moravian Church and president of the Theological Seminary and College at Bethlehem, Pa., was a great-great-grandson of Count Zinzendorf, upon whose estates was founded the Moravian Community in Saxony in the sixteenth century.

Dr. de Schweinitz's thorough medical training, based upon a wide general cultural foundation, opened for him wide fields of usefulness which he adequately covered. He received his training in letters, naturally, in the Moravian College, whence came his bachelor and master degrees. Later, in 1881, his scholarship was further recognized on his receiving the degree of Doctor of Laws and, in 1914, that of Doctor of Humanities from his alma mater. The University of Michigan in 1922 honored him by making him a Doctor of Science, as did Harvard in 1927.

His life was an abundant one. He was professor of ophthalmology in the Philadelphia Graduate School of Medicine from 1902 to 1924, during which time he was also consulting ophthalmologist to the Philadelphia Hospital. He was a major in the National

Reserve Corps, and saw active service in France from 1917 to 1919 as lieutenant colonel in the Medical Corps of the United States Army, and was an officer in charge and consultant in ophthalmology to the office of the Surgeon-General. At the time of his death he held the rank of brigadier general in the Auxiliary Medical Reserve.

His contributions to medicine were varied and important. He was a member of the Board of Medicine and Surgery for the history of the war. His work, *Diseases of the Eye*, was one of the most popular in all American medical schools. In a few years it passed through ten editions. He was one of the authors, with Dr. Randall, of an extensive work, *Diseases of the Eye, Ear, Nose, and Throat*, and was an author of the standard work on *Toxic Amblyopias* (The Alvarenga Prize Essay). He was the American editor of Haab's *Ophthalmoscopy and External Diseases of the Eye and Operative Ophthalmology*, and co-author with Dr. Holloway on *Pulsating Exophthalmos*. He edited, with Dr. Jackson, the *Ophthalmic Year Book*, from 1905 to 1909. His writings included numerous articles and monographs on ophthalmological and neurological subjects. In 1923 he was invited to give the Bowman lecture in London, a distinction which goes only to the most eminent ophthalmologists in the world.

Dr. de Schweinitz was president in 1922 and 1923 of the American Medical Association, a member of the American Philosophical Society, of the Academy of Natural Sciences, of the Ophthalmological Society of the United Kingdom, of the *Société Française d'Ophtalmologie* and the *Société Belge d'Ophtalmologie*. He had been president of the College of Physicians in Philadelphia; honorary fellow of the New York Academy of Medicine; honorary member of the Royal Society of Medicine in London (Section of Ophthalmology) and of the Hungarian and Egyptian Ophthalmological Societies. He was awarded a plaque by the *Société Française d'Ophtalmologie* in 1924, the Howe prize in ophthalmology in 1927, and the Huguenot Cross in 1928.

His association with our own Society was most helpful. He was appointed a member of the Advisory Committee in April, 1926. A note made in the records of the then National Committee for the Prevention of Blindness says:

"In recognition of the eminent service which Dr. George Edmund de Schweinitz has rendered to this Committee, and with the hope that this service may be continued and his hearty co-operation secured, Dr. de Schweinitz was unanimously invited to become an advisory member of this Committee."

He was elected honorary vice-president of the Society in June, 1935.

In appreciation of his great service for the prevention of blindness he was presented in 1930 with the Leslie Dana Gold Medal, on which was the inscription: "Dana Medal for the Prevention of Blindness Awarded to George Edmund de Schweinitz, M.D., Wise —Learned—Patriotic—Teacher and Guide."

In the death of Dr. de Schweinitz, ophthalmology loses one of its great leaders, and the National Society for the Prevention of Blindness one of its most helpful advisers. We extend to his relatives and friends our sincere sympathy in the loss which all of us have sustained.

—PARK LEWIS, M.D.

John M. Wheeler, 1879–1938

The untimely and unexpected death of Dr. John M. Wheeler has removed from the Society's Board of Directors one of its most distinguished and useful members. It seems fitting that we should make appropriate expression of our sorrow and our loss in THE SIGHT-SAVING REVIEW.

We cannot make more than a very brief review of his life and his career, and of his interest in and his service to this Society.

He was born in Burlington, Vt., a typical New England college town, on November 10, 1879, and was educated in the city public schools. He received his A.B. and M.D. degrees at the University of Vermont, of which his father was both an alumnus and its long-time treasurer. It was a small state university with little endowment and less material equipment, but it had on both the academic and the medical faculties a few men who had the double gift of teaching and inspiring. He served an internship at the New York Eye and Ear Infirmary, the story being that his first application

was rejected because there were candidates who had more assurance or came from institutions that were better known. As an intern, he was the perfect assistant—no labor was too great; no detail, too small. He went to the foundation of things and was not only intelligent and of sound judgment, but he had, beyond most, the steadiness of hand and the delicacy of touch that eye surgery requires. Furthermore, he had the temperament of the great surgeon, the willingness to assume responsibility and, when he had done his best, the ability to banish worry.

Dr. Wheeler was popular with all his surgical superiors. When he finished his internship he went into the office of one of them and eventually inherited a practice which had been continuous since the beginning of ophthalmology as a specialty.

He became an assistant in the hospital clinic of another physician, eventually succeeding him as full surgeon and, later on, as professor of ophthalmology at Bellevue Medical College. As the older men retired, Dr. Wheeler's reputation grew, not because he was pushing and aggressive, but because of his universally conceded ability.

When Columbia University brought about the creation of the Medical Center with the Presbyterian Hospital as the nucleus, he was chosen to develop the new Institute of Ophthalmology. It was for all practical purposes built around him. He was entirely responsible for the selection of his subordinates and, with them, spent months of meticulous study of the requirements and design of the perfect eye hospital. He had the unique ability of inspiring subordinates with complete confidence in his knowledge and surgical skill, and also of building up an *esprit de corps* among them; of assigning to each the task appropriate to his ability; of encouraging them to do original work—often work that he had hoped to do himself if he could ever find the time. No man has ever more enjoyed the affection of his associates and subordinates.

He was a very great eye surgeon, for he not only did superlatively the operations that his predecessors had devised, but he originated numberless new ones or improvements on the old. In the World War he was assigned the care of the mass of unfortunates who were crippled and disfigured by war wounds and hasty war surgery.

He developed out of this supposedly hopeless task a marvelous

technique of plastic surgery which seemed likely to put him among the ophthalmological immortals. As he grew older this reputation increased, and more and more of the desperate cases were referred to him for a final judgment, where the chances of failure even at his hands were often far greater than the chances of success.

He was an ideal consultant—always helpful and understanding, willing to assume responsibility, and rarely critical. His thoughtfulness and kindness for his patients, whether rich or poor, were proverbial.

A few years before his death he lost one of his own eyes from a malignant growth—a misfortune which would ordinarily have terminated his surgical career. With steadfast courage he forced himself to forget the possibilities of recurrence and convinced himself that he could still operate up to his own high standards and kept up his work, both executive and surgical, so that his last years were in many respects his greatest ones.

He was deeply interested in various phases of prevention of blindness, and in May, 1931, was elected a director of this Society. He was always ready to give advice on our problems, to which he brought his characteristic independence of thought. For instance, he did not believe that myopia was always the serious disease that most social workers are trained to believe.

He was a hearty supporter of our medical social eye service program and lent his aid to our sight-saving class training course when it was given at Columbia University. One of the last things he did was to prepare a letter calling the attention of his colleagues to our work, and suggesting ways in which they could be of help. This was to have been sent out over his own signature. Professional honors and degrees came to Dr. Wheeler increasingly year after year. In 1936 he was awarded the Leslie Dana Gold Medal, fittingly inscribed: "Skilled Surgeon, Great Teacher, Understanding and Sympathetic Physician and Friend."

—Ellice M. Alger, M.D.

The Forum

THIS section is reserved for brief or informal papers, discussions, questions and answers, and occasional pertinent quotations from other publications. We offer to publish letters or excerpts of general interest, assuming no responsibility for the opinions expressed therein. Individual questions are turned over to consultants in the particular field. Every communication must contain the writer's name and address, but these are omitted on request

Concerning the Reported Increase of Ophthalmia Neonatorum Among Pupils Now Entering Blind Schools

I suspect the increase in the percentage of ophthalmia neonatorum in blind school admissions from 6.7 per cent in 1933 to 9.1 per cent in 1937, noted in Dr. Jost's article in the June, 1938, SIGHT-SAVING REVIEW, page 83, may be due to the fact that a large number of partially-seeing pupils did not enter schools for the blind in 1937, whereas a goodly number of pupils who should have been in sight-saving classes really entered Braille schools in 1933. Braille classes contain many more pupils who have had ophthalmia neonatorum than do sight-saving classes. Indeed, the ratio in my survey of the first 134 pupils in the Chicago Braille and sight-saving classes in 1928* showed only one case of ophthalmia neonatorum in the sight-saving group and ten cases of ophthalmia neonatorum in the Braille group.

It is readily to be seen that if a large number of pupils who have not had ophthalmia neonatorum were removed from the Braille classes, the proportion of those left in the Braille classes who had had ophthalmia neonatorum would be increased.

I think this accounts for the apparent increase of ophthalmia neonatorum among the children who are now entering schools for the blind and that the increase is apparent and not real.

E. V. L. BROWN, M.D.
Chicago, Ill.

Editor's Note.—REVIEW readers will, no doubt, be interested to learn that since the publication of Dr. Jost's article alluded to above, once again in the school year 1936–1937, the proportion of new pupils with blindness caused by ophthalmia neonatorum dropped to 6.7 per cent.

* "Sight-Saving Class Work from the Standpoint of the Ophthalmologist," *American Journal of Ophthalmology*, Vol. II, No. 2, February, 1928.

Note and Comment

Legibility Requirements for Schoolbooks.—The general consensus of experimenters in the legibility of textbook types is that 24-point type is the most legible for first-graders; 24-point and 18-point type for second graders; and 18-point type for pupils up to the fifth grade. It has been found, however, that 12-point type is satisfactory even for first and second grade texts when 4-point leading is used.

Covers in color appeal to children, who prefer blue and red and dislike black. For the actual printing, however, the most legible combination is black ink on white paper.

Illustrations, especially in color, unquestionably add to the attractiveness of the books. Children in primary grades tend to favor books containing bold central groups, with few but striking and well-selected details. They enjoy humor and action or other emotional qualities that tell a story. Older children also like pictures containing humor and action. In addition, they are interested in imaginative figures, landscapes, and wild animals. The decorative type of illustration does not meet with favor among children of any age group.

These factors apply, of course, only to children of normal vision and do not take into account the special problems of sight-saving class pupils.

Progress in Denmark.—No "gloomy Dane" is Dr. Gordon Norrie, of Copenhagen, who has recently retired after 35 years of service as surgeon to the Royal Institute for the Blind. He can look back on a record marked with splendid achievement. From 1886 to 1900 he fought hard for the introduction of Credé's method, and finally succeeded in inducing the Royal Board of Health to order midwives to use a 1:150 solution of silver nitrate at every birth. Results became speedily evident. Forty-two of the blind children born between 1892 and 1906 were blind from ophthalmia neonatorum; in the past 15 years, however, there have been only five cases and not one case has occurred for the past four years.

There is no blindness from smallpox in Denmark, for vaccination has been compulsory since 1810; nor is there any blindness from trachoma.

Royal Eye Hospital Combats Eye Hazards.—A dismaying increase in industrial eye accident cases from 6,500 in 1935 to 7,400 in 1936 and 7,700 in 1937 has led the Royal Eye Hospital in London to open a permanent museum for the instruction of workmen who are treated for eye injuries. The purpose of the exhibition is to encourage the wider use of goggles, veils, guards for grinding machines, and other safeguards in occupations involving risk to the eyes. The hospital has formed an industrial eye committee to further this object by making employers conscious of the necessity for safety measures and combating prejudice or negligence among the workmen whom the appliances are intended to protect. In the exhibition are shown different types of goggles for such occupations as grinding, welding and riveting; and metal-spattered goggles, glare and dust proof, which are used by air pilots. These spattered glasses are partly mirrors, partly transparent, so that harmful rays are reflected without cutting off the wearer's view. A grim exhibit consists of eyes removed with splinters still in them—fifty cases occur annually at the hospital.

Mr. Joseph Minton, surgeon to the hospital, estimates that throughout Great Britain 250,000 eyes are injured every year through industrial causes, with resulting blindness or serious damage to sight in numerous cases. Approximately 85 per cent of these accidents are preventable.

Research on Effects of Glare.—An experiment is being conducted at the National Physical Laboratory in England to show the effects of glare in an artificially lighted street. Observers are asked to detect models of a man or dog introduced into a film projected under conditions simulating those existing in typical lighted streets. The varying degrees of glare are indicated by the time taken by various observers to detect these models.

Pioneer Rural School Installs Modern Lighting.—For 80 years pupils at the Eola school in Oregon learned their three R's under

inadequate, uncontrolled illumination. In 1937, however, a new building was erected and equipped with automatically controlled artificial illumination.

At Eola school the photronic tube is mounted on the inside wall over the blackboard. Here, in a standard 24- by 36-foot classroom, the "electric eye" maintains a constant vigil over light upon the pupils' desk-tops. Artificial lighting for the school is provided by six modern indirect luminaires. They provide the pupils with glareless, even illumination relatively free from shadows. Three of these units are automatically turned on and off by the photronic tube working through the relay switches.

Noise Impairs Vision.—Dr. Charles A. Elsberg, of the Neurological Institute at Medical Center, New York City, has made researches in hearing and vision which indicate that a person needs more light in order to see an object after hearing a loud noise than he did before such stimulation to hearing.

Applying this finding to highway accidents, Dr. Elsberg says that if a person "is using his vision up to the limit of its capacity, and a truck with a muffler cut-off is passing him, the loud noise will influence his vision, which is already taxed to the fullest degree. As a result, he may not be able to judge distances as well and, in an emergency, he may have an accident."

Visual Standards for Drivers.—Recognizing the need for greater care in the operation of motor vehicles on the highways, the House of Delegates of the American Medical Association at the recent San Francisco meeting adopted the following resolution. The standards set forth were developed by the Section on Ophthalmology, where this program had been under consideration for many years:

Resolved, That the following be accepted as the approved American Medical Association standards:

A. For an Unlimited License
   1. Visual acuity with or without glasses at 20/40 Snellen in one eye and 20/100 Snellen in the other.
   2. A form field of not less than 45 degrees in all meridians from the point of fixation.
   3. The presence of binocular single vision.

4. Ability to distinguish red, green, and yellow.
5. Night blindness not to be present.
6. Glasses when required be worn while driving and those employed in public transportation be provided with an extra pair.

B. Visual Standards for Limited License
   1. Visual acuity of not less than 20/65 Snellen in the better eye.
   2. Field vision of not less than 60 degrees horizontally and 50 degrees vertically from point of fixation in one eye.
   3. Diplopia not to be present.
   4. Glasses to be worn when prescribed.
   5. Co-ordination of eye, mind and muscle to be fully adequate to meet the practical visual road tests.
   6. A limited license not to be issued to those employed in public transportation.

C. Renewals, Retesting, and Re-examinations
   1. Renewals of license to be issued at least every third year. The applicant shall with each renewal make a declaration that he knows of no visual defect which has developed during the past year.
   2. Retesting of acuity to be made at least every six years.
   3. If any visual defects have developed, an examination by an ophthalmologist and the report thereof, to be required before reissuing the license.
   4. License to state thereon the specific limitation for driving.

Palestine Makes Sight-Saving Advances.—Despite unsettled conditions in Palestine, the Ophthalmic Hospital of St. John of Jerusalem made remarkable progress in 1937, treating the largest number of new out-patients on record, with a total of 109,523 patients. Among Jewish patients there was a marked increase in both number and percentage. Trachoma, one of the great scourges of this country, accounted for 85.82 per cent of the cases; although this figure seems shockingly high, it is the lowest ever recorded at the hospital. Some improvement was noted in the "blindness rate" in spite of a severe but localized outbreak of acute conjunctivitis affecting the townspeople. Potent factors in this outbreak were malnutrition, debilitation caused by measles and whooping-cough, and the widespread economic distress caused by unemployment.

Universities Continue Eye Course.—Teachers, nurses, social workers, and those in allied fields will be interested in the "Survey of Eye Conditions" course to be given this year at New York University School of Education and Teachers College, Columbia University. The course is presented by ophthalmologists and technicians and presents a comprehensive study of the physiology and pathology of the eye and methods of treatment. It is offered in evening sessions at both universities. For detailed information address inquiries to the Office of the Secretary, Teachers College, Columbia University, 525 West 120th Street, New York City; Professor Helen C. Manzer, School of Education, New York University, Washington Square, New York City, or Miss Ruth B. McCoy, Director, Prevention of Blindness Service, New York State Department of Social Welfare, 205 East 42nd Street, New York City.

Eskimos to Receive Eye Tests.—In a region where "night" prevails for six months, the problem of night blindness may be a cause for much concern. In order to relieve Eskimos who suffer from this defect, Dr. Howard H. Conn, of Johns Hopkins University, recently left for the eastern Arctic, where he will make eye examinations of the Eskimos and seek to effect a cure by proper treatment.

British Industrial Eye Injuries.—Of 192,539 non-fatal accidents reported in the *Annual Report* of the chief inspector of factories and workshops for the year 1937, 8,889 were eye injuries sufficiently serious to disable the victim for more than three days.

The industries reporting the largest number of such injuries are as follows: metal industries, 2,205; machinery, 1,779; engineering, 1,299; shipbuilding, 571; docks, buildings, and warehouses, 404; textile industries, 271; light metal trades, 252; chemical industries, 250; clay, stone, lime, and cement industries, 221; woodwork, 173; pottery and glass industries, 101.

German Definition of Blindness.—The National League for Industrial Employment of the Blind in Berlin has established, with governmental approval, certain practical definitions of blindness, designed to facilitate classification of virtually blind persons. In addition to the totally blind, all persons are considered as blind

whose central visual acuity amounts to from one fiftieth to one twenty-fifth of normal. Practical blindness may also be considered present even if the visual acuity is greater than one twenty-fifth of normal, in special cases, as, for example, if a depreciated acuity of vision is accompanied by considerable diminution of the visual field. The latter class is composed chiefly of patients who present certain disorders: optic atrophy, glaucoma, pigmental degeneration, retinal detachment, hemianopia. Further particular conditions in which blindness may be assumed are nystagmus with phantom movements of external objects perceived, nyctalopia following pathologic changes of the inner eye, and, finally, cases in which a full practical evaluation of central visual acuity is qualified by the advanced age of the patient.

Unusual Cause of Myopia.—Temporary myopia may occur in normally seeing children when they are confronted with a strange handwriting, a new problem, or a phrase in a foreign language, according to a Nova Scotian physician, who states that this phenomenon may be proved by observation under the retinoscope.

"Ticker Tape" Records Eye Movements.—Development of a new "ticker tape" method of recording eye movements while the eyelids are closed was reported by Dr. Ward C. Halstead, a member of the staff of the Otho S. A. Sprague Memorial Institute in the Division of Psychiatry of the University of Chicago clinics. The eye, Dr. Halstead explained, acts like a miniature storage battery with a strength equal to 1/1,000,000 that of a battery used in an automobile. Every time the eye moves there is a fluctuation of current which is detectable by the new device. The amplifier manipulates a recording pen on waxed ticker tape paper, making a graph of the eye movement.

In an article in the *Journal of Psychology* Dr. Halstead reported that it is possible to secure reliable records of the direction and extent of eye movements while the subject is walking around a room. This flexibility is important in mental cases and is something not possible with other methods of recording eye movements.

The interesting possibility of recording eye movements while the subject is asleep is still to be explored.

Eye Shadow Used to Banish Glare.—When the seductive Cleopatra adorned her eyelids with green malachite, she not only enhanced her beauty, but also afforded her eyes some protection from the intense glare of the Egyptian sun.

Plastic Lenses.—Optical glass, such as is used for spectacles, transmits about 83 per cent of the light, as compared with a new lens of unbreakable plastic material, which transmits 95 per cent. This plastic lens, which has been tested in the goggles of football players, weighs about half as much as the same amount of glass. It is resistant to alkalis and to acids, except the strongly oxidizing types. Heat below 158 degrees Fahrenheit does not soften it nor is it damaged or discolored by sunlight. It may be colored with basic pigments and is soluble in esters, ketones, and coal-tar hydrocarbons.

Harvard Law Library is Light-Conditioned.—Harvard Law School students will find their reading of musty legal volumes much less of a strain now that the Langdell Hall reading room has been light-conditioned. This reading room, the largest in the country, now has a general illumination of a cool daylight quality, achieved by specially designed lighting units which balance the excess yellow-red of incandescent light with the blue-green output of mercury-vapor tubes.

In use, the daylight quality of the lighting has come to be particularly appreciated in the late afternoons when a certain amount of natural daylight still enters the room from the two-story windows. There is no noticeable contrast between the natural and artificial light sources, and no disturbing quality change as artificial lighting is turned on.

Current Articles of Interest

Industrial Eye Injuries, Joseph Minton, F.R.C.S., *Industrial Welfare and Personnel Management,* July, 1938, published monthly by the Industrial Welfare Society, Inc., London, England. The author is a surgeon at the Royal Eye Hospital, in London, which treats 50 to 60 cases of eye injuries daily. About 80 per cent of the patients come from the engineering and metal trades and the remaining 20 per cent come from building trades, chemical factories, coke making, loading and transport, paper factories, and printing works.

The commonest type of injury is foreign body in the cornea. Fortunately safety education has been so widespread that workmen usually go to the hospital for treatment rather than rely on their co-workers' attempts with penknives and toothpicks. Chemical burns of the eye, also numerous, are treated by a thorough irrigation with a saline solution, and followed by daily inspection of the eye. Electric welding conjunctivitis, a condition comparable to severe sunburn of the eye, is treated by the instillation of liquid paraffin or castor oil into the conjunctival sac.

The author attributes the high incidence of industrial eye injuries to the lack of provision of safety measures by many employers and to the complete negligence by many workmen in using the safety measures when they are provided. An important step in safety education is being taken by the Royal Hospital in its recent establishment of a museum devoted to the various causes of eye accidents.

Some Problems Encountered in Cataract Surgery, Watson W. Gailey, M.D., *American Journal of Ophthalmology,* August, 1938, published monthly by the Ophthalmic Publishing Company, St. Louis, Mo. The author stresses the importance of preliminary examination of the patient before operating for cataract. Any suggestion of uncompensated cardiac disease, chronic bronchitis, bronchiectasis, asthma, hypertrophy of the prostate, hemorrhoids, chronic constipation, high blood pressure, infected teeth, or dia-

betes should be thoroughly investigated and every effort made to rectify such conditions before the ocular operation is attempted.

The period in the development of a senile cataract when extraction is most advisable cannot be determined without consideration of the age, visual acuity, physical status, prejudices, and occupation of the patient. Perhaps the wisest standard to adopt is the patient's unhappiness at his inability to continue with his work; he is then ready to accept surgery.

For post-operative treatment, also, no generalizations may be made, as the peculiar aspects of each individual case must be considered. The author sets the tenth day as an arbitrary time for cataract patients to go home, but he prefers in all cases to wait until the eye is white. The eye should generally be covered and dressings continued for about two weeks, and the Fox aluminum shield should be worn at night for an additional week.

Highlights of the History of Ophthalmology, William Thornwall Davis, M.D., *Southern Medical Journal,* June, 1938, published monthly by the Southern Medical Association, Birmingham, Ala. The earliest written record of ophthalmology occurs in the Code of Hammurabi, 2250 B. C., a collection of Babylonian laws. Records have also been discovered in Egyptian papyri indicating that trachoma was even in early times a terrible scourge in the land of Egypt. The growing decadence of Egyptian medicine may be noted in the fact that the later manuscripts reveal more and more of superstition and the practice of magic in their therapeutic prescriptions.

Greek medicine marks numerous advances, particularly in the work of Hippocrates, who recognized the ophthalmias, pterygium, chalazion, ectropion, trichiasis, ulcers and scars of the cornea, nystagmus, and photophobia, and whose treatment of trachoma has not been materially improved upon by modern medical practice.

The early centuries of the Christian era were characterized by the beginnings of medical specialization, especially in the field of ophthalmology. The Arabians made particularly valuable contributions.

The chief contributions of the Middle Ages were the suggestion of the versatile Friar Bacon that lenses be used to correct vision

and the discovery by Leonardo da Vinci that the retina and not the crystalline lens is the organ of vision.

Beginning with George Bartisch, the father of modern ophthalmology, progress in ophthalmology has grown apace and is marked by advances in the fields of both medicine and physiological optics, the establishment of special eye hospitals and ophthalmological societies, and the publication of books and treatises on the physiology and the pathology of the eye.

The author expresses the opinion that advances in America, particularly since the World War, when European medical centers were impaired in their efficiency, have been so promising that America may now be said to lead the world in ophthalmology.

Injuries and Infections of the Eye, Arnold Sorsby, F.R.C.S., *The British Medical Journal,* April 23, 1938, published weekly by the British Medical Association, London, England. The author lists those types of eye diseases and eye injuries which may be safely treated by the general practitioner who is equipped with a minimum of specialized eye training, including the removal of foreign bodies which are not too deeply imbedded and the treatment of such common eye troubles as styes.

The Treatment of Infected Abrasions of the Cornea, Charles F. Kutscher, M.D., *The Pennsylvania Medical Journal,* August, 1938, published monthly by the Medical Society of the State of Pennsylvania, Harrisburg, Pa. The use of sodium hypochlorite in a solution of 1 to 5000 has been found highly effective in controlling corneal infection. This chemical is also successful in diminishing pain and, since it attracts only dead tissue, there is no increase in the amount of scar. The significance of this contribution to the treatment of corneal infections and ulcers is of greatest importance to physicians treating industrial eye injuries.

The Management of Heterophoria, Charles R. Hartsook, M.D., *Texas State Journal of Medicine,* August, 1938, published monthly by the State Medical Association of Texas, Fort Worth, Texás. In order to determine the presence of muscular imbalance the author makes a routine practice of testing for esophoria, exophoria, and

hyperphoria, at 20 feet and at 13 inches, using the cover and parallax tests. When an imbalance of consequence is found a complete examination of muscular functions is made. Treatment by base-in prisms is indicated only in exceptional cases and as a rule should be given only when all other measures have failed and surgery is not practical. Orthoptic training is usually the most satisfactory method of treatment. When surgery is undertaken the power of the abnormal muscle should be adjusted; hence in divergence excess a recession of the external recti is indicated. Where exophoria is caused by convergence insufficiency and the external recti are normal in power, the normal external recti should not be disturbed. The operation of choice should then be a shortening of the internal rectus or recti as the case may be. In all cases it is, of course, of greatest importance that the case be well studied before operative interference is undertaken.

Sulfanilamide in Gonorrheal Ophthalmia, Luis J. Fernandez, M.D., and Ricardo F. Fernandez, M.D., *American Journal of Ophthalmology*, July, 1938, published monthly by the Ophthalmic Publishing Company, St. Louis, Mo. The authors treated 14 cases of ophthalmia neonatorum by administering doses of sulfanilamide beginning with a dose of 2.6 grams daily and tapering off to 1.95 grams daily. In all cases useful vision in the affected eye was retained and in eight cases healing occurred without corneal involvement. The authors recommend the judicious use of sulfanilimide in all cases of gonorrheal ophthalmia in adults, whenever there is no serious contraindication. They also suggest that further study be made regarding its possible use for treating ophthalmia neonatorum.

Light Reserve for Occupations in Sight-Saving Classes, R. A. Kaz, M.D., *The British Journal of Ophthalmology*, August, 1938, published monthly by the British Journal of Ophthalmology, Ltd., London, England. The author stresses the importance of proper lighting for sight-saving class pupils in Russia, where dark winter days make this problem especially important. Clinical histories of sight-saving class pupils accompany the article.

Book Reviews

AN INTRODUCTION TO CLINICAL SCOTOMETRY. John N. Evans, M.D., F.A.C.S. New Haven: Yale University Press, 1937. 266 p. ill.

This is modestly called "An Introduction to Clinical Scotometry," and the author disavows any pretension as a trained investigator, but the average reader will find it a treatise so complete with physiological and scientific details that he will have little or no need for further pursuit of the subject.

Scotometry has always been a fascinating study and Evans has managed to retain that fascination while developing his hypotheses from a wealth of factual minutiae. Instruments and methods are carefully explained, and interpretations are based upon sound experimentations and reasoning.

The type is clear and the text is lucid. The reading time is slowed down only because of the technical nature of the subject. There are 226 pages of subject matter, including charts and tables, and the book presents a pleasing appearance.

The serious worker will enjoy this study.

—WILLIS S. KNIGHTON, M.D.

EXTERNAL DISEASES OF THE EYE. Second Edition. Donald T. Atkinson, M.D., F.A.C.S. Philadelphia: Lea and Febiger, 1937. 718 p. ill.

That the second edition of this work has appeared so soon after the printing of the first is evidence of the very general recognition and approval with which it was received.

While much of this material has been available in scattered volumes on ophthalmology and dermatology and in general medicine and surgical textbooks, in none have external diseases of the eye been presented in English so completely and so well pictured as in this volume.

As in the first edition, the author prefaces his work with a brief retrospect of ophthalmology as relating to medicine. The early Egyptians, he tells us, had undoubtedly a degree of skill and a ra-

tional understanding of disease that were lost in subsequent periods.

The errors of the Galenic system were perpetuated through the centuries and it was not until the gulf between speculation and science began to be bridged by the Arabians that a new birth in philosophy, literature and medicine gave a renaissance in Arabic thought that preceded that in Europe by several centuries.

While the Mohammedan and the Christian were forbidding the desecration of the body by dissection, due to the superstitions of the times, the Jew with his analytical mind was outstripping his contemporaries and Maimonides of Spain was keeping alive and adding to what little was then known of ophthalmology.

To Italy, in the work of Vesalius, belongs credit for the earliest actual contributions to the structural formation of the eye, but it was not until the sixteenth century that Bartisch, a German barber surgeon, published a book, profusely illustrated by wood cuts, on diseases of the eye.

Some of the more obvious external diseases were well known to the ancients. Trachoma and purulent ophthalmia existed in Egypt at least 3,500 years ago, and pterygium was operated upon successfully in very early times. The work of the Italian, Antonio Scarpa, published in German in the early part of the century and translated into English in 1806, served as a groundwork for the later advances made by Stromeier, Dieffenbach, Beer and others, and after the invention of the ophthalmoscope by Helmholtz leading to the brilliant discoveries of von Graefe, Critchett, von Arlt and their long line of followers.

The author, after this brief summary, arranges his work in 15 chapters, treating of the eyelids, the lachrymal apparatus, the orbit, the conjunctiva, and the sclera, the iris and the ciliary body, with subdivisions given to the diseases to which each tissue is subject. This is followed by chapters on glaucoma, on the crystalline lens and the external ocular musculature.

The hygiene of the eye, history taking and case records are well considered, as are the remedial measures to be employed. The present edition includes, as the first did not, suggestions on slit-lamp microscopy, orthoptic training and allergic ocular manifestations, thus bringing the subject up to date.

The use of the slit-lamp is especially emphasized as it should be, because to the unaided eye many important external details are lost, and in many visible ocular conditions, such as the earlier stages of iritis, the slit-lamp is invaluable as an aid in differential diagnosis.

The author judiciously takes a conservative view on the effects of training on the amblyopic eye when he says that "when mechanical devices are used persistently and through periods sufficiently prolonged, defective fusion faculties have occasionally become normal, eyes with false fixation and false projection have sometimes been corrected, and strabismus has thereby been prevented or improved."

"Alternating strabismus with high degree of antipathy to fusion are not to any extent improved by the methods of orthoptic training now in use." This is a necessary warning where inexperienced enthusiasts are urging that orthoptic training classes be formed in our public schools.

The work is well written, printed on good paper, with clear type, admirably illustrated with photographs from nature or the wax models of distinctive cases, and should be of use not only to the general practitioner but as a source of reference to the specialist in external diseases of the eye.

—PARK LEWIS, M.D.

A TEXT-BOOK OF OPHTHALMIC OPERATIONS. Harold Grimsdale, M.B., F.R.C.S., and Elmore Brewerton, F.R.C.S. Baltimore: William Wood and Co., 1937. 322 p. ill.

The reader might question the aptness of the title of this book when he fails to find several well known operative procedures, *e.g.*, Reese's muscle resection. On the other hand, he will probably find many others that he never heard of before.

Operative habits and preferences tend to follow geographical and temporal trends and unless one finds a good many old friends in a book of this kind, one is inclined to feel that something is lacking. The authors have not attempted to produce an encyclopedic work; their chief concern has been "to give the student, in outline, the chief ways in which the various problems have been attacked."

They admit that this plan has led them to include a good many operations primarily of historical interest. The presentation of the

material is excellent and the schematic drawings are adequate, but it might have been better had some of the sections been cut down. Lid operations take up fifty pages and detachment of the retina only seven.

There is little that is new concerning the operations listed, but the authors pride themselves mainly on their arrangement of the material and the choice of operations.

The book contains 322 pages, including the index and an extensive bibliography. The paper is fair but the type appears somewhat crowded.

—Willis S. Knighton, M.D.

School Nursing—A Contribution to Health Education. Revised and Enlarged Edition. Mary Ella Chayer, R.N., A.M. New York: G. P. Putnam's Sons, 1937. 329 p. ill.

Miss Chayer is recognized as a leading authority in the field of school nursing. The National Society for the Prevention of Blindness, therefore, looks with pride on the first part of Chapter V, which is concerned with the nurse's part in the conservation of vision, as presented in this revision.

Not only has Miss Chayer brought her data up to date, but she has quoted from the Society's publication, "Conserving the Sight of School Children," for the principles and techniques of vision testing.

There are a few minor details this reviewer would like to have amplified. For instance, "light from left side" is correct for the right-handed child when he is at work because otherwise his hand would cast a shadow on his work. But with the left-handed child, just the reverse is true. Again, because it is impossible to keep any text abreast with changing standards, it would seem desirable to refer students to standard setting groups rather than to quote a standard which a few months later may be altered. In relation to school lighting, the standard for desk illumination was changed from 10 foot-candles to 15 foot-candles, according to the *American Recommended Practice of School Lighting*, 1937, almost immediately after Miss Chayer's revised edition was published. Another value in this procedure is that it avoids the necessity of making generalizations to conserve space. Such generalizations frequently result

in inadequate and superficial knowledge which may lead to erroneous conclusions.

The author has, nevertheless, given an excellent and concise presentation of the nurse's function in conserving the sight of school children.

—Eleanor W. Mumford, R.N.

Briefer Comments

Teaching for Health. Marguerite M. Hussey, Ph.D., New York: New York University Bookstore, 1938. 312 p.

This text covers the fundamentals of health instruction for teachers, giving brief, but adequate, attention to the problems of vision and lighting. The value of the book for sight-saving class teachers is slight in that the visual problems discussed are of a general nature. Although reference is made to the peculiar problems presented by the child with defective vision, it is unlikely that any of this information is new to the trained sight-saving class teacher.

Safety First—and Last. Charles E. Dull. New York: Henry Holt and Co., 1938. 262 p. ill.

The title of this book is somewhat misleading in that it gives the impression that the text deals with safety practices in general, whereas it is actually limited to safety on the highway. As such, the book is clearly and intelligently organized and attractively illustrated. Its references to vision are confined to a brief description of glare and highway illumination and a passing reference to the vision tests which are given to applicants for a driver's license.

Intensive Rural Hygiene Work in Netherlands India. J. L. Hydrick, M.D. Batavia-Centrum, Java, Netherlands India: January, 1937. 62 p. ill.

A study of public health practices adapted to the special needs of the natives of Netherlands India, largely concerned with problems of sanitation and prevention of disease. The book is copiously illustrated with photographs and charts showing the advances that are being made under intelligent medical supervision.

Books Received

Remedial Reading Drills. Thorleif G. Hegge, Ph.D., Samuel A. Kirk, Ph.D., and Winifred D. Kirk, M.A. Ann Arbor: George Wahr, Publisher, 1936. 66 p.

Manual of Directions for Use with the Hegge-Kirk Remedial Reading Drills. Samuel A. Kirk, Ph.D. Ann Arbor: George Wahr, Publisher, 1936. 50 p.

An Approach to Choral Speech. Mona Swann. Boston: Walter H. Baker Co., 1937. 79 p.

Shadow on the Land. Thomas Parran, M.D. New York: Reynal and Hitchcock, 1937. 309 p. ill.

Current Publications on Sight Conservation

Note.—The National Society for the Prevention of Blindness presents the most recent additions to its stock of publications. Except for the more expensive ones, single copies are sent free upon request. Unless otherwise specified, they are reprinted from The Sight-Saving Review. New publications will be announced quarterly.

273. **Illumination Levels and Eye Comfort Conditions,** Walter B. Lancaster, M.D. 12 p. 10 cts. Discusses comfortable lighting, including the psychological aspects.

274. **One-Eyed Drivers,** H. R. DeSilva, W. H. Frisbee, Jr., and P. Robinson. 12 p. 10 cts. Describes the visual limitations of one-eyed persons as automobile drivers.

275. **Organization of Social Forces for Prevention of Blindness,** Audrey M. Hayden. 12 p. 10 cts. Describes the work of the Illinois Society for the Prevention of Blindness in securing important legislation.

276. **What Social Workers Should Know About Preventable Causes of Blindness,** Eleanor Lee Hearon. 12 p. 10 cts. The author discusses the symptoms and treatment—from both the medical and social service viewpoints—of some common causes of blindness.

277. **Syphilis in Eye Clinics,** Robert R. M. McLaughlin, M.D. 4 p. 5 cts. Maximum efficiency in eye clinics requires routine Wasssermann blood tests for each patient; maintenance of social service departments; and use of uniform methods of recording.

278. **Possibilities for Prevention of Blindness in the Public Assistance Program,** Eleanor Brown Merrill. 8 p. 5 cts. Presents the responsibilities of public assistance workers, prevention of blindness workers, and health officers and nurses in the campaign against blindness.

279. **"The Nurse's Responsibility in Saving Sight"—a New Talking Slide Film.** 6 p. A pictorial description of a talking slide film prepared especially for work with nurses.

D121. **The Rôle of the Institutional Nurse in the Treatment of Ophthalmia Neonatorum,** Bernice Perdziak, R.N. Reprinted from *Hospital Management,* February, 1938. 4 p. $1.50 per 100. Outlines procedure in handling ophthalmia neonatorum.

D122. **Classification of Causes of Blindness.** Committee on Statistics of the Blind, 1938. 4 p. Presents etiological and topographical classifications.

D123. **Recommendations: Essential Steps in the Attack on Blindness.** Committee on Statistics of the Blind, 1938. 6 p. Presents 10 recommendations.

Contributors to This Issue

Dr. Walter B. Lancaster, a member of the Society's Board of Directors, is a practicing ophthalmologist in Boston.

Mr. H. R. DeSilva, Mr. W. H. Frisbee, Jr., and **Mr. P. Robinson** have been affiliated with the Bureau for Street Traffic Research at Harvard University, Cambridge, Mass.

As executive secretary of the Illinois Society for the Prevention of Blindness, **Miss Audrey M. Hayden** is an outstanding personality in the field of sight conservation.

A former scholarship student of the National Society for the Prevention of Blindness, **Miss Eleanor Lee Hearon** is now director of medical social service at the Colorado General Hospital in Denver.

On behalf of the Social Hygiene Committee of the New York Tuberculosis and Health Association, **Dr. Robert R. M. McLaughlin** prepared his survey of syphilis in eye clinics.

The program of medical social eye work of the National Society for the Prevention of Blindness has been developed chiefly through the efforts of **Mrs. Eleanor Brown Merrill,** an associate director.

Book reviewers: **Dr. Willis Knighton,** assistant surgeon at the New York Eye and Ear Infirmary; **Dr. Park Lewis,** first vice-president of the National Society for the Prevention of Blindness; **Miss Eleanor W. Mumford,** the Society's associate for nursing activities.

Prevention of Blindness from the Ophthalmologist's Point of View*

Ellice M. Alger, M.D.

A HISTORY of the sight conservation movement from ancient times to the present day, told from the medical and sociological viewpoints

Attitude of Ancients toward Blindness

Few people stop to think how recent the movement for prevention of blindness really is. Blindness itself is, of course, no new problem, for the blind have appealed to the pity and the charity of the sighted from the most ancient times. It must have been common enough even then. Accidents and the injuries of war where battles were all settled in hand-to-hand conflict took care of that. The ancients, too, must have had much the same list of diseases and infections that we know today. Hippocrates, three thousand years ago, prescribed a treatment for trachoma that in some respects resembled our own. There have been, too, from the earliest times physicians who, more or less, specialized in diseases of the eye; who had all sorts of lotions reputed to be useful to ailing eyes; and who indulged in all sorts of speculation about the nature of sight and the morbid processes of their patients. They did a good many operations with considerable success, such as couching for cataract, and operations for deformities of the lids and the like. There was some practical prevention of blindness too. The men who first put visors on helmets or learned to protect the eyes from the glare of the sun on ice and sand by slotted bits of wood were real benefactors.

*Speech delivered on the occasion of the presentation of the Leslie Dana Gold Medal to Dr. Alger, at the 1938 annual meeting of the National Society for the Prevention of Blindness.

But on the whole the ancients considered blindness a terrible individual misfortune, which could be treated and sometimes cured, and it never occurred to anyone to try to prevent it on any large scale. Life was too cheap and suffering too universal.

All through the middle ages little advance was made. Galen was still the medical authority of the time, but his reputation was so great that it was considered almost impious to question his dicta or try to improve on his methods. His writing rested like a dead hand on medieval medicine for a thousand years and little progress was made.

New Problems in the Nineteenth Century

Even a hundred years ago the situation was not so very different. The scope of blindness had increased considerably, for the duration of life was getting longer and longer, and there were more and more of the degenerative and senile changes that had not been recognized in earlier times. The modern industrial era, too, was well on its way, with its great increase in near work and strain and its new types of accidents and disease.

A few physicians knew considerably more about the eyes than their predecessors, but their services were reserved entirely for the well-to-do. They no longer couched cataracts but extracted them as best they could without either local or general anesthetics. The distinguishing characteristic of the great surgeon was emphatically speed.

Glasses had been in use for a long time and were no longer handed down from one generation to another as precious heirlooms, but it was considered beneath the dignity of the physician to fit them and they were practically self-selected. They were used entirely to improve vision either far or near. The correction of eyestrain was yet to come.

The practice of the specialist up to, let us say, the time of our Civil War, was almost entirely confined to external eye diseases. He could see the conjunctival infections, or corneal ulcers, or mature cataracts readily enough, but as yet no one had ever looked at the inside of the living eye and recognized beginning cataract or chronic glaucoma or optic atrophy or retinal hemorrhage.

The old textbooks abound in words like amblyopia and amau-

rosis, which meant a blindness of the eye without any obvious cause, and the early specialists were almost all general surgeons who had gradually limited their work to the eye, or at least to the eye and ear, nose and throat.

Early Steps in Prevention

Vaccination Against Smallpox.—But some steps had already been unwittingly made in the prevention of blindness. There was a time when practically everyone had smallpox, either mild or severe, and many patients developed corneal ulcers and lost one eye or both. Probably a quarter of the blind owed their misfortune to this cause. The introduction of vaccination against smallpox, which was done without the slightest idea of preventing blindness, nevertheless practically abolished one of the great causes of blindness. Most of the great advances in medical science have been useful to ophthalmology in the same way.

Establishment of Charity Eye Hospital in London.—Moorfields, the first great London charity eye hospital, was founded in 1805, and since that time similar charities have spread all over the world. They marked the first attempt in history to give medical help to the eyes of the poor and unfortunate. Each one of them has become not only a center of help for patients, but of indispensable training for physicians both young and old. They have been among the greatest and most direct efforts at the prevention of blindness. Today we have them scattered all over the United States. But we are still far from having enough of them to put the achievements of medical science within reach of the great majority of our people.

Advances in Medical Science.—But suddenly in the middle of the last century things began to happen in the world of science that pushed the frontiers of medicine, including ophthalmology, further forward in 25 years than it had progressed in all recorded time.

Pasteur, who was a chemist and not a physician, developed bacteriology, which revealed the causes of many hitherto mysterious diseases. All we know of antisepsis, asepsis, immunity, antitoxin, and vaccines, which are the foundation of modern medicine and surgery, stems back to him and his disciples. He was one of the great men of all times.

Neisser discovered the gonococcus, and Credé found that, by putting a few drops of weak silver solution into the eyes of the newborn, he could practically abolish ophthalmia neonatorum and with it some 25 per cent of blindness.

Virchow, with his cellular pathology, taught us how to examine tissues with the microscope, and study the processes of disease and death which might mean prevention and cure in the days to come.

Morton and Simpson gave us ether and chloroform and abolished the agonies of surgery and obstetrics.

Carl Koller, who practices among us today, discovered cocaine, which, with its substitutes, has made possible a deliberate and unhurried operative technique and enormously broadened the field of ophthalmic surgery. Most modern eye operations could not be done without it. Few men have ever made a greater contribution to humanity.

Invention of the Ophthalmoscope.—Helmholtz invented the ophthalmoscope and so made it possible to see the interior of the living eye, which no man had ever seen before. It was now possible to study what was happening in cataract, glaucoma, brain tumor, optic atrophy, and a host of other anomalies. It was the greatest forward step ever made in ophthalmology. It made diagnosis possible, which is the foundation of all intelligent treatment. It linked ophthalmology again with general medicine from which it had tended to become separated.

It is interesting to note here that an English layman, five years before von Helmholtz' time, devised a much better ophthalmoscope but did nothing with it because the leading London ophthalmologist, the greatest surgeon of his time, could not see that it would be of any particular use. It is hard to believe that a really great man could be so devoid of imagination, and that progress could thus be delayed.

Donders systematized the refraction of the eye and made it possible for the patient to have his glasses fitted intelligently instead of practically selecting his own. Later on it logically followed that glasses could not only improve vision and help the blind to see, but relieve strain and give relief to thousands who thought there was nothing the matter with their eyes because their vision was so

keen. Incidentally, the ophthalmologist finally convinced himself that the fitting of glasses was not beneath his dignity.

George Gould popularized the idea that eyestrain was not only bad for the eyes themselves, but was a potent cause of ills like headache, nausea, vertigo, and many nervous conditions.

Stevens discovered anew the ocular muscles and their function. He devised a terminology which has not been improved upon to this day, and made possible the elimination of another great cause of strain.

Improvements in Illumination

Vast improvements have been made in illumination. Candles, whale oil lamps, kerosene, and gas had their day, or rather their night, before Edison invented the incandescent electric light. Since that time the illuminating engineer has developed improvements in lighting in the school, the office, and the factory which seem to leave little to be desired but which, nevertheless, are being constantly advanced.

Gullstrand invented the slit lamp and made possible the microscopic examination of the living eye.

Changes in Ophthalmic Lenses

Neither must we forget what we owe to the generations of experts who have steadily improved ophthalmic lenses. They are now susceptible to mass production and are within the reach of the poorest. The last of these is the contact glass, which slips under the lids like a glass eye. It is practically invisible, and it makes an almost miraculous improvement in vision in certain types of disease. It abolishes our greatest refractive defect, corneal astigmatism. Unfortunately, it is still very expensive.

As each forward step in science leads logically to another, so the constant flow of ophthalmological discoveries keeps opening the way for others which are new and interesting and useful. From time to time we may expect some of them to be revolutionary and important. We are still seeing new vistas from insulin, vitamins, endocrines, and filtrable viruses.

All these new improvements in diagnosis and treatment clearly showed that the sight of a great many blind people might have

easily been saved if taken in time and a movement for the prevention of blindness begun among the ophthalmologists.

Ernst Fuchs—Pioneer in Prevention

A young, relatively unknown Austrian ophthalmologist presented in 1885 a prize essay calling attention to the amount of blindness that could easily be prevented and making a strong plea to his colleagues to take up the work. It was afterward published in book form, and aroused much interest among them. This man was Ernst Fuchs, who was to become one of the world's most famous ophthalmologists, and who, during a long and successful career, never lost sight of this phase of his work. It is interesting to note that in his old age and after the financial ruin that followed the inflation of the Austrian mark he spent much time with his colleagues here in America, and among other marks of esteem was granted this same Leslie Dana Gold Medal.

The first organizations both here and abroad consisted almost entirely of ophthalmologists and were generally both short-lived and inefficient. They met annually or semi-annually, had no facilities for raising money, and their work consisted almost entirely of the reading and circulation of technical papers with some popular lectures. Every one of us has belonged to groups of this kind, and while the work was fundamental and of high character, its practical value was quite limited.

Sociological Aspects of Prevention

Economic Arguments.—But since that time a new social theory has developed, the effects of which can hardly be overstated. There is a rapidly growing conviction that the individual is a mere unit in a great social organization. If he dies in childhood, he has cost his parents and society a fairly definite sum, which death has deprived him of the opportunity to repay. Every such death is a total loss. If he grows up, his value is estimated in the same way. If he creates more than he consumes, he is an asset. If he consumes more than he creates, he is an actual liability, since modern society no longer allows him to perish miserably of neglect but collectively assumes the responsibility for his comfort and his care. Society

therefore has a direct interest in the health of each of its units, because ill health not only increases cost but lessens productivity.

There are said to be 120,000 blind people in the United States who make a profound claim upon the pity and the charity of their neighbors. They have through often unnecessary blindness become social liabilities instead of assets. In addition there are millions of people who are not blind or likely to be blind in the ordinary sense of the word, but who make their living by their eyes, and who fail to realize anything like their full efficiency by reason of defects in their eyes, or in the conditions under which they work. The suffering and the economic loss from inefficient eyes is beyond all calculation. The prevention of blindness has therefore tended to widen more and more into the conservation of vision.

Work of Welfare Agencies.—In addition the general public had become very much interested in its own health. This was plainly evident in the patent medicine era. As this fell into disfavor because of its obvious dishonesty, its place was taken by more legitimate forms of health propaganda.

Numerous groups formed among those with similar interest. The anti-tuberculosis movement, the Red Cross, and the various organizations interested in public health nursing and teaching are cases in point. And there are innumerable other groups whose interest reaches from mental hygiene to sex information and birth control. Every one of us belongs to some of them. Books on all sorts of health topics have become best sellers. The newspapers have health columns and report the proceedings of the important medical meetings. The radio features health and its care. A child going blind from glioma becomes suddenly a headline item.

A significant feature of the movement is that it has developed a large class of paid, full-time social workers. Their motives are beyond suspicion, their minds are ever on the alert, and they have built up a profound social influence. State and national political organizations have been quick to utilize their knowledge and their good will in organizing the great pressure groups behind socialized medicine, public health and social security. They form a sort of social fly-wheel which keeps the whole movement going evenly and steadily.

Achievements in Prevention of Blindness

Organizations for the prevention of blindness were among the earliest and most active of these societies, of which the National Society for the Prevention of Blindness is the largest and most influential. It was definitely organized as a lay society under the guidance and advice of ophthalmologists and such other experts as seemed necessary. Its policy was well expressed in the phrase, "Nothing that concerns the saving of sight is a matter of indifference to us." During its 30 years of existence it has had a remarkable growth and an international influence, of which this is not the time nor place to speak in detail.

The passage of time has abolished many of the once common causes of blindness. We have already alluded to smallpox. The treatment of diabetes with insulin has prevented, or at least postponed, ocular manifestations which were once much more common.

Early Emphasis on Ophthalmia Neonatorum.—When this Society was first formed, its interest was largely centered on ophthalmia neonatorum, an inflammation which occurred frequently in the eyes of the newborn children. With the methods of treatment then in vogue the results were appalling and it was estimated that nearly half the children in the schools for the blind owed their disability to this cause.

Twenty-five years before this Credé had taught that a few drops of nitrate of silver solution instilled at the time of birth would practically abolish the disease, but the drops were not used and the blindness went on. Today the combination of legal compulsion and public education, in which this Society had a large part, has practically abolished the disease, while in the few cases that do occur the methods of treatment have been so improved that little damage is done. But the drops must be made a routine part of every childbirth or we shall have sporadic cases and deplorable results.

Decrease in Industrial Blindness.—The cheap wood alcohol which was the cause of many spectacular cases of sudden and complete blindness was another of the Society's great concerns; today the entire output is used in the film industry, and blindness from drinking is practically never seen.

Industrial accidents and poisonings which were once common

have become rarer and rarer, because of the strict supervision now exercised over industrial processes. The spectacular removal of large foreign bodies from the eye with the giant magnet is rarely seen today. The workman who does not carry out the precautions directed by the industrial engineer and the insurance inspector loses his job without debate. Even the accidents of play and those associated with the Fourth of July have been materially reduced.

Practical Elimination of Trachoma.—At that time trachoma was one of our great problems. New York City was full of immigrants who had brought this contagion from the old countries and were spreading it in the new. Our public schools were full of children who had a kind of pseudo-trachoma over which health authorities got very much excited. There were special clinics and special hospitals for trachoma, and the bi-weekly rubbing the lids with copper sulphate was a major source of ophthalmological income. Today, owing largely to efficient health measures and the general improvement in the standard of living, we can hardly find cases enough to demonstrate to our students. In certain sections of the Midwest and the South, however, and among our Indian wards, it is still a major problem; while the lowering of nutritional and sanitary standards after the war have brought it back again in many parts of Europe and Asia. In Egypt and Palestine 85 per cent of the population are more or less blind from it.

Present-Day Problems

Syphilis as a Cause of Blindness.—We have practically abolished smallpox. The next great cause of blindness to go is apparently the age-old great pox, or syphilis. More than 25 years ago Schaudinn identified the spirochete which caused it. Wassermann and his disciples devised a very certain method of diagnosis, and Ehrlich gave us the arsenical therapy which has so lessened the dangers of infection and increased the possibilities of cure. But until the last few years the word syphilis could not be printed in the public press or spoken over the radio. Today a great popular approval sanctions laws calling for compulsory reporting and treatment and for blood tests before marriage and in pregnancy. Methods of diagnosis and treatment have so improved that it is practically possible to guarantee a healthy child even though its parents be

diseased. The various methods of heat therapy have vastly increased our control of chronic syphilis among adults.

Hereditary Causes.—But blindness will never disappear entirely. We may conquer ophthalmia in the newborn, but there still remain the various forms of hereditary blindness. As interstitial keratitis disappears among our children, we see crowding up the regiment of the cross-eyed, whose eyes we are no longer content to straighten merely for appearance sake. They now must have their amblyopia cured and their fusion trained so that they may have binocular vision like the rest of us, and this is no small matter.

Improvements in Operative Techniques.—We see many detachments of the retina, which we used to advise our patients to charge up to profit and loss, so hopeless did they seem. Today a high percentage of them can be cured, if discovered early, by methods of operation which seem to get simpler and simpler, but more and more effective. We have seen the successful implantation of human corneal grafts restore sight in some of those miserable children whose white, staring eyes have hitherto been beyond our greatest skill. But this is as yet no field for the occasional operator. The problem is not to get the graft to live but to have it remain transparent, and only a very few men can report consistent good results. Today there is an increasing number of children with progressing myopia. We place them in sight-saving classes whose teachers this Society has had a major part in training, where they get the same education as other children. Meantime the progress of the disease is retarded until, in their early twenties, the myopia tends to become stationary.

Increasing Proportion of Old People.—The time was when the old people in every community were a small minority of its population. Today they are approaching a majority, while their support and their employment constitute one of our great social problems. Among them we have a corresponding increase in the blindness that results from high blood pressure, and the senile and vascular diseases, where early discovery may mean not only the prevention of blindness but the prolongation of life itself.

We shall see more and more cataracts. We now know that the average cataract exists for a good many years before it actually begins to interfere with sight, and we have faith that better

knowledge will sometime show us how to retard it or even prevent it entirely. Meantime there is hardly any surgical condition that offers such a good prognosis in competent hands.

We shall see more and more of the senile changes in the retina and the optic nerve, and we shall have a higher percentage of the functional conditions which are often far harder to detect and treat.

We shall see more and more of the various forms of glaucoma, that dangerous hardening of the eyeball which is so difficult to recognize in its beginning and so destructive to sight when neglected. We have many more facilities for its diagnosis than our fathers had; and our therapeutic and surgical measures are much better. Nevertheless, the disease is often overlooked or neglected and our treatment still leaves much to be desired. We know how it occurs but as yet can only guess at its why.

Responsibilities of the Medical Profession

Our first great need in all these conditions is early diagnosis and for this we are inadequately prepared. It is just as desirable to have an occasional competent examination of the eyes as of the heart and lungs or the kidneys, particularly as one grows older. There are not enough ophthalmologists in the country to do a fraction of this work. They are the only men trained to recognize disease when they see it, but their education is becoming so prolonged and so expensive that no small city can give them adequate opportunity or support. We must do everything we can to increase the opportunities of the small town ophthalmologist who very often doubles in ear, nose and throat. He is being encouraged to do post-graduate work, to attend clinics at the great hospitals, to join special societies, to subscribe to special journals, and so keep alive his interest in one of the most engrossing branches of medicine. Particularly he must know the limits within which he is competent to work, and not try to extend them too fast.

We are endeavoring to weed out the inexperienced and the incompetent by practical examinations given only to those who have had several years of training. The day is almost past when the simple degree of doctor of medicine authorizes a man to dabble in any of its branches.

We are endeavoring to train nurses, technicians, and social

service workers who can function competently under the supervision of the ophthalmologist and so lighten his labors and extend his field.

But practically half our people never have their eyes examined except by an optometrist. In one way or another we must increase his training and give him a professional point of view, so that without necessarily being able to make accurate diagnoses or being allowed to treat actual disease he may be able to note abnormalities and secure competent help.

The second great need is adequate treatment, whether medical or surgical, for the ills that have been discovered. Here we are even worse off. In the large cities it is possible for one who knows how to secure adequate diagnosis and treatment whether he be rich or poor. In the small towns and in the country roughly half our population live in a fool's paradise so far as their eyes are concerned. There is no one who can tell them with any authority whether or not their eyes are healthy. There is no one who can prescribe intelligently for them, and there is no place where they can secure the emergency treatment for ocular illness or accident which may at any time occur.

These are indeed serious and perplexing problems. Until we can make available for all our people the diagnostic and therapeutic skill which our better ophthalmologists are able to offer, these problems are only half solved.

Senile Cataract

Purman Dorman, M.D.

IN simple and vivid language the author describes the development of cataract, and indicates methods of treatment

Importance of Sight

It is probable that only the blind and the physicians to the blind realize what a major part in human life is played by sight. Half our world is what we see. Except for music, the arts are visual—for the major portion of good poetry consists in "images," mental pictures of what we have actually seen previously, while fiction rests upon descriptions of what the dramatis personae do, thus calling upon visual memory for their most moving effects. Science in a sense is but the refinement of sight through the instrumentality of microscopes, telescopes, and cameras. To what extent our everyday life depends upon sight only those who have been blinded can begin to realize. The physician who gives sight back to a man or woman returns to that person much of the world, brings back much of the beauties of life itself.

Incidence of Cataract

Almost a third of the people over sixty years of age who are totally blind are so because of cataracts. The movements and colors of life have been curtained by the opacity of a tiny bit of tissue, the lens within the eyeball. Cataracts have been known as far back as history is recorded. The word itself dates back hundreds of years; our distant forefathers, noticing that the whitened area within the normally black pupil resembled the white, foam-flecked spray of a waterfall, described the opaque lens as a "cataract"; and the old word continues in our use.

The picturesqueness and exactness of description unique to the

Bible are well exemplified in its descriptions of eye afflictions. For instance, the passage, Genesis xvii. 1: "When Isaac had become old and his eyes so dim that he could not see," strongly indicates that Isaac had a maturing senile cataract. In fact, cataract was common enough to bring into practice an operative technique aimed at its cure: The Code of Hammurabi of about 2000 B.C. fixed a penalty for operating unsuccessfully upon a blind eye. From the earliest time of man until today, cataracts have been the most frequent cause of blindness in old age.

While there are, of course, no statistics that have come down to us of the incidence of cataract in Isaac's time, it is probable that it was as great as it is today. There are 1,000 applications for blind relief in this state and, according to a recent survey, about 2,000 blind in the total population of 1,600,000. Among the 1,000 from whom applications for blind relief have been received, 320 were diagnosed as having "cataract." It is fair to assume that the same proportion would hold true of the other 1,000 from whom applications have not been received, so that there would be a total of about 640 who have cataract. This latter figure would be the basis for the statement that contemporary statistics of the blind in the State of Washington show the incidence of mature cataracts causing blindness to be .04 per cent of all the population. Cataract is the cause of one-third of the cases of blindness occurring in persons over 60 years of age in Washington, and compilations from other states or districts will reveal similar figures.

Cataracts and blindness, however, should not be too closely linked together, in spite of their apparent hand-in-hand association, and even though cataracts are the major individual cause of blindness. Among cataracts themselves various forms must be distinguished. These call for variations in treatment and suggest varied observations upon the possible future course of the different kinds of lens changes.

Normal Lens Anatomy

The eye is a small, round ball about the size of a large marble. The circular transparent area of the front part of the eye is the cornea. A short distance behind the cornea is the iris, of brown or blue color, with a normally black center, the pupil. Directly be-

hind, and virtually touching the iris, is the lens. As more or less light comes within the eye, the iris changes size so that a small or large pupil results, the pupil size being dependent upon the amount of light outside the eye. The normal lens also changes in shape but not in size. As the eye focus changes from a near point to a point farther away, the lens becomes thicker from front to back. This automatic focusing arrangement is seldom noticed because it is done effortlessly.

Definition of Cataracts

Normally, light goes directly through the cornea and lens just as it goes through two pieces of clear windowpane. However, when the inside windowpane is similar to frosted glass, a condition exists comparable to the condition in the eye when a cataract is present. Frosted glass breaks up light in a manner virtually the same as a mature, ripe cataract. Light can still pass through the frosted glass or cataract, but reading through either is impossible. One important diagnostic feature remains: that of perceiving in which direction a light appears. Upon that essential fact depends the decision of whether an eye may be helped by certain measures.

Although a cataract lens may prevent good vision, the inside portion of the eye, the retina, is not damaged because of the unused lens. Light projection, therefore, is not changed and removal of the lens should give a satisfactory result. But if the retina has been damaged because of disease, removal of the lens will avail nothing.

The life of the lens of a human eye does not follow the usual line of development which characterizes other parts of the human organism. The eye is fully developed at parturition, and may be said to begin its development into old age almost at the birth of the child. In fact, sometimes a lens initiates such a rapid change that it prevents vision in a child who is but a few years old. This condition is termed a congenital type of cataract, a name not strictly true but very suggestive.

Every eye lens has a nucleus, or vital center, and it is this nucleus that begins to age at birth, or even before. This physiologic change is the only structural alteration to be considered at present. It takes place spontaneously, without any initiating injury, pro-

gresses slowly, and is a normal accompaniment of increasing age. The eyes of middle-aged persons and of every elderly person undergo this normal, non-pathological change which is compensated for by the use of glasses. It is a type of change but little different from those which do seriously interfere with vision and which cause total, or almost total, loss of sight.

Changes in the lens of an eye occur without pain and come about so gradually that the alteration in vision may be easily unnoticed until fairly well advanced. The lens changes may even be so slow that never within the lifetime will any treatment be required beyond the more or less frequent changing of glasses. On the other hand, the rate of progression, especially in persons over fifty, may be fairly rapid, reaching its culmination as a cataract within a year or two. Normally, from five to ten years are required before complete "maturity" of a cataract is reached. Definite knowledge as to why cataracts form in one person's eyes and not in another's has not yet been determined, although certain diseases—notably diabetes—cause a disturbed nutrition within the entire body and promote the formation of cataracts within a few months.

Inasmuch as cataracts that occur only in the older ages are being considered in this article, we have but two main types of cataract to describe: those having a hard center, a nuclear sclerosis; and those with a hard periphery, a cortical type. The hard center is the culmination of a process that ends in a loss of water and albumins that are soluble in water. The entire lens first slightly increases in size because of a change in the amount of water which it contains. When more water is included within the confines of the lens covers, and the lens swells, the opacity becomes increased. After the opacity has extended throughout the lens, the original lens volume is resumed by a slight loss of water. During the swelling period improved vision is sometimes noticed, at times the improvement being so great that glasses may not be needed. As the lens returns to its original size, vision is usually reduced to a marked degree.

Those cataracts due to a hardened periphery, cortical cataracts, result from changes in the layers of the lens outside the center of the nucleus. Opacities similar in appearance to the spokes of a wheel or large irregular shapes or wedges may form. Water is

absorbed by the lens and increased volume or size results. Opacification of the entire lens usually follows, with the natural resultant poor vision.

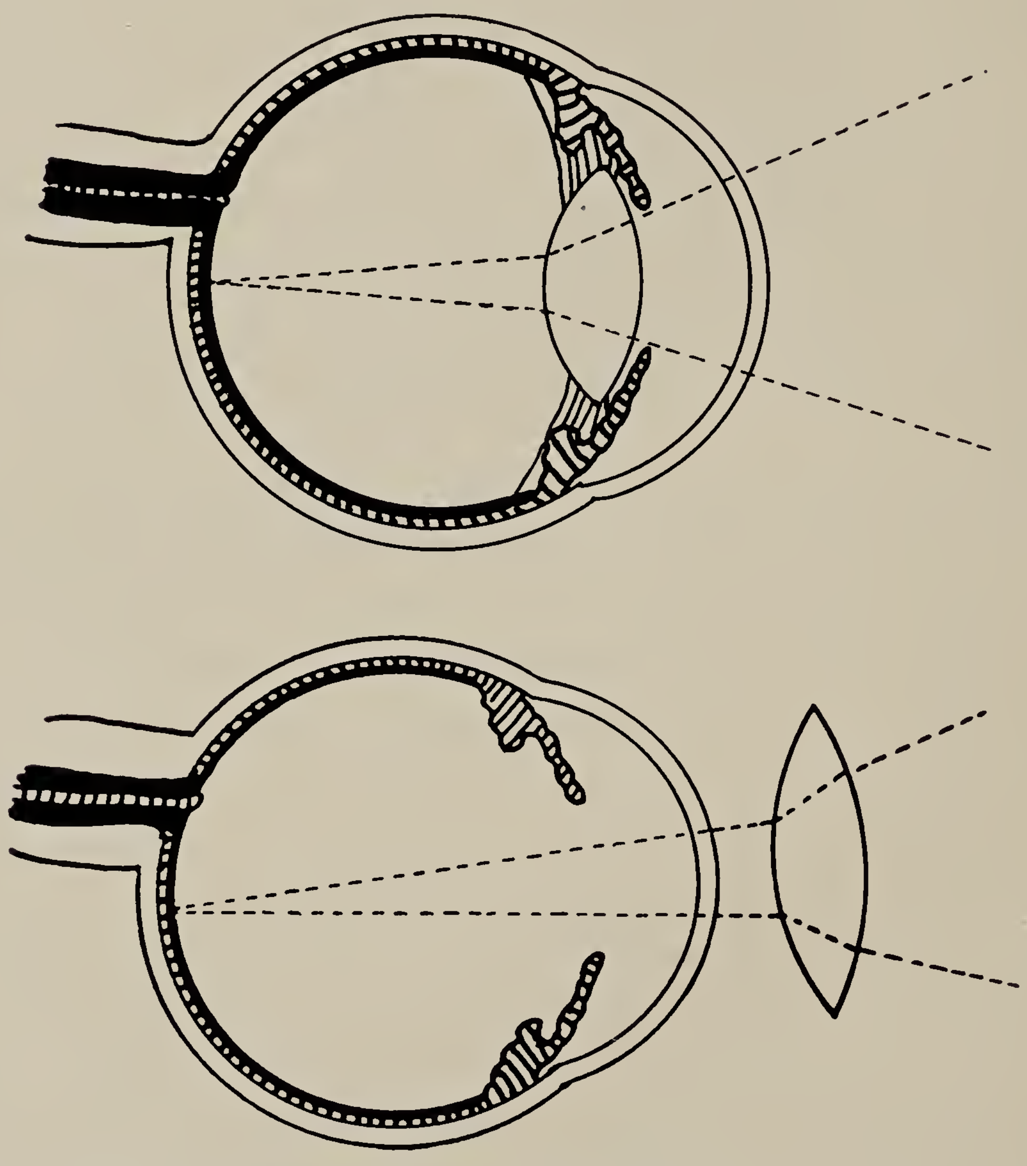
Methods of Treatment

While certain drugs have been found to cause cataracts, none has been discovered which will prevent or always retard their progression. Many drugs as well as many drug combinations have been tried. Numerous other wishful methods of treatment have been devised, such as massage, heat, and light; but no such treatment has yet been found that secures a predictable cure in even half of the cases tried. Not infrequently the originator of a new treatment has results that are not obtainable by another eye physician. Furthermore, progress of a cataract is so slow, and often inconsistent, that, with or without treatment, it may seem to be improving.

Virtually all eyes that have become blind by cataract alone can be helped. Many of these eyes may gain normal vision and most, if not all, may gain a very usable vision by the removal of the opaque, clouded lens. The method of removal has been so greatly improved that it results satisfactorily in nearly every case; even statistics of as late as thirty years ago cannot show results that compare with those of today.

Various means for the removal of the lens are known. Until recently, in modern medical practice, lenses were depressed away from the pupil into the rear part of the eye. At the time of Hammurabi it is not improbable that an actual cut was made into the eyeball for the removal of the lens. An exact description of the method prevalent at that time is not available but apparently the lens was removed in one of the methods used today. The method apparently was forgotten, because during a span covering hundreds of years only ineffectual procedures were used. About a hundred years ago, the modern method for removal of a cataract lens was initiated. At the present time the lens is completely removed from the eye. Sometimes the outer of the two covers, or capsules, of the lens is not removed, this being known as the extracapsular method. Sometimes the lens and both capsules are removed at one time, the latter then known as the intracapsular method.

The extracapsular procedure has been practised for many years, and is applicable in every case of senile cataract. The intracapsular method for removing a lens is a newer development and, in those cases in which it can be used, has several advantages over the extracapsular type. In addition, the great improvements of local anesthesia within the past few years have markedly altered the methods and immensely improved the results.



Upper diagram indicates the path of light passing through the normal lens inside the eye; the lower diagram indicates the path of light passing through the lens outside the eye from which a cataractous lens has been removed. Note that the retina receives rays in much the same manner as in the eye in which the natural lens is present.

After the cataract lens is removed, the eye cannot see well unless a spectacle lens is used to replace some of the power that was formerly supplied by its own lens. A glass lens is now placed outside the eye and worn just as an ordinary pair of glasses. If a favorable result has been obtained, one pair of glasses is used for distant and a different pair for near vision, or a bifocal lens may

be used, just as in ordinary life. No longer is the eye handicapped by the frosted cataract lens, but instead light comes into the eye through this artificial lens exactly as it would pass through a normal eye lens. It is still necessary to wear one pair of glasses for near vision and one pair for distant vision, for the power of accommodation depends only on the ability of the lens to change shape, adjusting itself for different focus, either near or far. The entire procedure may be stated simply as the removal of a useless cataract lens and the substitution of a clear, usable glass lens that is worn as easily as any other pair of glasses.

Results

The prevention of blindness by the removal of the lens is truly remarkable—almost miraculous. Results of even fifty to sixty years ago are incomparable. More than 95 per cent of all eyes operated on for a cataract have very usable vision, while the majority have almost as good vision as was present before the cataract began to develop. Each eye presents an individual problem, not only in the method of operating, but also in the results to be expected. Accurate statistics have been gathered in the State of Washington of blind people on relief. Of the total, approximately a third owe their blindness to cataracts. Of this group, only certain cataracts are amenable to treatment, but of that selected group who were treated almost 90 per cent have had such good vision that they are no longer eligible for blind assistance. Equally good results are obtained in private practice, in all parts of the country. No matter how telling the statistics of improved vision—they cannot describe the drama of restored sight. Words are inadequate to express the elation of a blind person who can again use his eyes; who is freed from dependence upon others; and who has been given back the beauties of a world of color and form and motion.

When Shadows Fall

E. K. Smith

A MOVING account of the emotions and experiences of a cataract victim before and after a successful operation

IT JUST could not happen to me; no one in my family had ever been bothered with eye trouble; and, in fact, glasses as an aid to vision were something for late middle age, and then only to avoid the annoying necessity of holding the book at arm's length. Indeed, if their arms could have been stretched a little more, I doubt if my folks would have bothered with glasses. No one of my own or the prior generation had ever been in a hospital, save as a visitor, and medical help was had only in extreme cases. So I consoled myself with the idea that my failing vision was due to overuse of the eyes, and, accordingly, eased off in my reading and writing.

Still my eyes were not right, did not seem to be able to continue at a task for any period of time, and, worse still, even ordinary vision was handicapped. I tried a stronger bulb for the light fixture in my room; I cut down on my work under artificial light; but the trouble would not remedy itself. Bits of information from various books I had read came back to me, and conversations half remembered were now recalled—about hemorrhages, kidney trouble, and other ailments; but the idea of some progressive eye disease never occurred to me.

The worries of professional life, my heavy business engagements, and the financial worries of the depression, then in its full tide, did nothing to help the nervously exhausted state in which I found myself. My own doctor had died a short time before and I had not engaged any one in his place to whom I could turn as freely as to him, who had been a boyhood friend. I knew now that I would have to stop business temporarily, if not permanently, and this

added to my troubles. The office must be taken care of; my employees who had been with me for years must be looked after; my investments must be guarded; and cash must be amply provided for medical and hospital attention.

I stumbled through all this, dreading the subways and the dark streets as winter drew on, for darkness seemed to increase my difficulties. I came home while it was still light, which curtailed my working hours. I gradually gave up going out at night, and, when travelling about the city, used taxis, which painfully increased expenses. It is disheartening to watch the meter in a cab, but to see it go around and around, not even stopping at the traffic lights, all the way down to the Wall Street district, was enough to discourage an optimist. I shifted as much of my work as possible to other shoulders, but there was an obligatory minimum that could not be shirked. Stairways became a nightmare; the edge of one step, if of the same color, blurred into the next.

One night, on leaving the subway to walk a half dozen blocks home in the bracing air of a November dusk, a fear came on me as I realized that I could not tell by the lights whether a vehicle was moving or still until it was almost on me. On this walk, which naturally was slow, I turned down a side street that had ordinary illumination, but not the brilliance of the avenue, and in the middle of the block I ran against a man coming toward me because I could not see him despite a bright light on the corner.

Another time I was riding home on the subway—on a local, of course—peering painfully through the windows as the stations passed, trying to distinguish either the characteristic symbols or the numerals of the street or avenue. I stumbled out blocks beyond my destination and crossed over and took a downtown train, but stood by the door of the car platform until the familiar appearance of my usual stop warned me to get out. The flashing lights and the warning horns of the automobiles at a crossing confused me, and I realized that life in general was geared to the normal and those without normal vision were handicapped even in their most ordinary pursuits.

Finally matters worked themselves out; my employees were gradually located in other offices; my business was taken care of, my bank account strengthened to reasonable proportions, at least

enough to take care of things for the present; and then I went home and rested and slept for a week. Why I did not immediately go to the specialist recommended I do not know; perhaps it was a fear of what his verdict would be. I was getting a taste of shut-in life, as I could not read, and went out for a walk only when someone accompanied me.

At last, finding no further reasonable excuse to detain me, I went to the office of a well-known eye doctor, located in a medical building in the midtown section. The directory in the entrance hall contained a regular "who's who" in the medical and surgical life of the city. My engagement was for 10:30 A.M.; at 10:45 I entered, stumblingly, into the private room for an examination. Behind a flat-top desk sat a small, gray-haired man with a small gray mustache, busily writing. After greeting me and requesting me to be seated, he continued writing in silence for a minute or so, although it seemed much longer. Then a series of questions: how long the trouble had lasted; when it was first noticed; what illnesses I had had; when the acute symptoms first appeared; my age and occupation; use of glasses; and other queries I have since forgotten. The examination next took place, most of which in the excitement made no particular impression on me, although I have a recollection of trying to read rows of letters, which diminished in size with each new line. Then I rested my head in a frame with my chin on a bar, while a large circular instrument with fan-like radiations from the center and a lighted bulb in the center, revolved, with the operator seated behind and looking through, moving the disk back and forth on its axis. Then some drops were slowly placed in my eyes and the doctor made a further test in a dark room. First he raised a candle above and carried it below and to either side of my eyes, and then he pointed a small electric flashlight from one side to the other, so that its rays struck my eye. He questioned me about my reactions. Both the candlelight and the flashlight were distinctly seen. Next, while still in the dark room, the doctor asked me to guess the number of fingers on his hand, which he opened and closed so as to form different number combinations. I did not have much success as things were pretty dim and about all I saw was the general outline of the hand. It was impossible to call the number of fingers held open at any time. Again we went

back to the circular, fan-like instrument for further examination. Finally the doctor examined my eyes with a powerful magnifying glass which was lowered until it touched my eye. This concluded the examination, which seemed rather an ordeal to me, and I sat there while the doctor sat behind his desk writing quietly, and finally, placing the pen in its holder on the stand, he asked me, "You know what it is, probably?" And he confirmed my suspicion that I had a cataract.

I thanked him and put off the question of an operation for a week, at least, until I had straightened out certain matters. As I went home in a cab, I thought over the situation. I knew nothing of cataracts, except that they could be relieved by an operation, but what this operation meant, to what extent it would restore my sight, or whether the cure was certain, were beyond my knowledge. At the examination the elderly physician spoke most encouragingly of the success of most cataract operations, and urged that no delay take place, as I was almost helpless in getting about. These kindly observations did not register very well, as I wanted to get away and think matters over, but I made an appointment to call upon him the next week and arrange for hospitalization. Then I started buying the necessary equipment for a stay at a hospital of a week or ten days.

The hospital was a large gray building, with an immense free clinic devoted to the special treatment of eye, ear, and throat ailments. The private pavilion was located on the upper floors, and consisted of a large number of rooms of various sizes, with and without baths, well furnished and delightfully free from the stereotyped hospital atmosphere. Indeed, during my entire visit at the institution, save in the operating room, I always felt as if I were in some hotel. True, the coming and going of doctors, the white uniforms of the nurses, and the occasional period of intense activity caused by an emergency case were reflected in the daily life, recalling one to the actualities of the case. But ordinarily the sound of children's voices, the deep tones of physicians greeting each other, an occasional burst of radio music from the open door of some convalescent, and the constant stream of visiting friends and relations, gave a vibrant touch to the place. The peculiarities of the ailments to be treated and the course of the treatment of these special ill-

nesses seemed not to require that complete silence and tip-toed quiet one associates with hospitals, or it may have been a conscious effort on the part of the authorities to get away from all suggestions of sanatorium life. I conversed with relatives, friends, physicians, surgeons, nurses, hall nurses, and dietitians, until my room became known facetiously as the "crossways" of the hospital. From the moment I awoke to the time I was tucked in at night, I had no lonely moments. Greetings were sent by patients in other rooms through the nurses, and offers of hospitality were frequent, if one were so inclined. Radios were installed in many rooms on my floor, and on a warm evening the voices of Amos and Andy could be heard floating down the hall. It was good fun, that and the nurses' gossip, telling of the daily life of the floor, how the stage star was taking her operation, or the elderly doctor, unused to medical treatment for himself, was proving a handful for the nurse. It kept one from that bane of all sick cases, self-pity, and, perhaps, dejection.

The morning I entered was warm for March, and the windows of the taxi were open, but, owing to the dark, cloudy day, and my eye trouble, I saw but little on my way down. After an interview with the clerk in charge, I followed the porter, who had my bag, to the elevator, and arrived at the room that was to be my home for a week or so.

My nurse met me, and in a few minutes, after I had put on my pajamas, I climbed into the immaculate high raised bed. The usual analysis was made, a sedative pill given, and shortly thereafter the anesthetic drops were spreading over the eyeball, producing a slightly dizzy feeling which soon wore off. Some further drops were given, and then, wrapped in a bathrobe, I was trundled out to the elevator and taken to the operating room. On the way down the corridor from my room a well-meant jest from another nurse to mine, about "taking your patient for a ride," did not set well on my nervous mind—the implications were too painful. I dropped the bathrobe and at the nurse's directions climbed up a small stepladder of about three treads to reach the operating table, where I lay full length under a very bright light, scarcely three feet above my head. The assisting surgeon skilfully washed my face and eyelids with a sponge and soap and then syringed it off with warm water. As soon as I could open my eyes after the

washing I saw the operating nurse, the orderly, and the assisting surgeon moving about quietly in white robes, head and chin cloths.

And now, after a warning that a "little inconvenience" would be felt, the eyelids, upper and lower, were punctured and some solution of cocaine was used quite extensively, so that the power to open or shut the eye was temporarily lost. This having been tested to the satisfaction of the operating surgeon, a ring or band, called, I believe, a retractor, was inserted over the eyelid and on the eyeball to hold the lid back, all without pain of any kind, or indeed any definite sensation. "No matter what you feel, don't wink or squeeze your eye," said the surgeon. "If you want to hold on to anything, grab the sides of the operating table." And then I encountered the most peculiar sensation I have ever experienced. I knew and, indeed, felt the knives and needles cutting and entering the eyeball; I could feel the sharp edges or points, and yet there was no actual pain. It was as if it were all being done on someone else and I were looking on. The feel of the edges or points was just that sympathetic, imaginary sensation one has when viewing some such scene. It might just as well have been a schoolboy initiation, where long icicles are drawn across the skin and the unlucky blindfolded one is told that "cold steel" is being applied. Not many strokes were made in the whole operation, and only the last four really hurt—they were deep and swift and sure. One down, one across, again down and again across in the same place as the first cross-cut, and then I was told to relax, as it was over.

The eye was now washed, cleaned, and cleared, and soon a pad was applied to each eye. I could feel the cotton on the edges and the vaseline as the pads were strapped on with adhesive plaster. To keep out all light, a half mask was tied around the upper part of the face, a mask of black material with closed protuberances where the eyes are, shaped to fit the nose, an eyeless mask that must have looked a little weird. After being wrapped in a blanket I was carried on a stretcher down to the elevator and then to my room. I was put down on my bed, and without my moving, the stretcher, through a system of connecting straps, was disconnected, and slipped from under me without the slightest trouble; the wooden bars forming the sides became unhitched, and the canvas straps

forming the supporting bands were slipped from their connections, all easily and without disturbance to me.

And now began that period of quiet necessary after any operation, and particularly an eye case. No movement of the head was allowed; it must rest directly on the back of the skull; the arms could be moved, the legs also; even the hips could be turned slightly to relieve the strain on the back, but generally the body or trunk was not to be turned. With the eyes covered and the light completely shut out, a rather strange, half-dizzy sensation came over me and an almost uncontrollable desire to roll the eyeballs. Soon I felt an itching in the eye, and of course this was where the mask prevented any damage to the eye from a rubbing finger. As soon as the hand was irresistibly raised toward the eye, it touched the mask and I realized that I was on forbidden ground; in addition the covering kept the hand off the eye. After the operation there came a sensation of burning, probably due to the cocaine or other anesthetic used to deaden the nerves, but this lasted only an hour or so, and save for the dressing, practically no pain was suffered. But the hours passed rather slowly at first, broken occasionally by a visit or a glass of milk or some broth or tea. Soon I fell into the routine of the place; there was no restriction on talk; and many long and pleasant conversations were had with the nurses, friends, and doctors. As the day wore on and night approached the reaction came, and I suddenly grew tired but not sleepy, and after a half hour of quiet the old restlessness came back. Soon my neck felt strained and the bed-head was raised or lowered to relieve the tension. The bed could be raised or lowered at the head or foot, or arranged in a number of ways to ease the body, even if I could not voluntarily move my trunk or head.

Still there was very little sleep the first night; in fact, I do not believe I slept an hour the night through. Every time I would move (of course I could not see) my night nurse would be at my bedside inquiring about my needs and, if necessary, supplying them. The night ended, however, and after an early morning nap I was greeted by my day nurse, who had come on duty a little before. It was curious what a desire I had to know the time and how frequently I inquired about the hour. It really did not matter as I could not make any practical use of the knowledge I got from

learning the time, and yet at the moment it seemed very important. Once or twice during the first night I had a feeling of nausea and I feared that retching might start a strain or a hemorrhage of the eye with very unfortunate results. But nothing happened and small glasses of carbonated water restored my stomach to quiet and relaxation. The skill, patience, and willingness of the nurses made convalescence as near a pleasure as such a condition could be. The clever shifting of the bed linen, the bathing and dressing in bed without disturbing my position or causing me any discomfort, were always marvels to me. The care for the room's temperature, ventilation, and light, the guarding of the patient from chill or danger from damp clothing or bedding was constantly in evidence. The sponge bath at night and the alcohol rub induced many a good night's sleep. Of course the diet increased materially as the time went on, and on the second day I could be moved, but not turn myself, on one side, that is, to the side opposite the eye operated on. Indeed, never during the whole time I remained in the hospital did I sleep on the side where the operation occurred.

After the second day the mask was taken off, the eye pads were removed, and the eye was examined under a strong light by the operating surgeon, and after he had bathed it with warm, sterilized boric acid solution the pads were replaced with new ones, the mask put on, and the quiet life resumed. Save that the nurse had to move me, there was little restriction on me except that I must refrain from tossing about. The easily adjusted bed made me comfortable; I could sit or lie down or change my position in a number of ways.

This went on for a week, and then one day the doctor, making his daily examination, took out of his pocket a magnifying glass and after I had correctly counted the fingers which he presented to me, he surprised me by showing me a watch crystal through the glass and letting me see the dial. I could not at first believe it, but there were the hands, there were the numerals, and there was the time as plain as I had ever seen it in my life. This was an old medical trick, of course, but it aided materially in restoring my confidence in the full restoration of my sight.

All the goings-on in the hospital were described to me: the little child in Room 10 was going home tomorrow; the young woman

across the hall was a much-publicized debutante; a certain well-known educator had a bad ear and was being treated in the end room. I was regaled with the names of the celebrities who had been in the hospital for treatment, who had suffered from my own trouble, and were now back in civic life, working as of old. All the old hospital jokes were told, and when the young house surgeon came to make his evening visit, it was usually to smoke a bit and tell stories. Of course I was examined as to my affairs, and I suppose my history or whatever I told was familiar to the other nurses as well. There was no harm in the small talk about me, and through it the patients got acquainted, in a fashion, so that greetings were sometimes sent to one another.

After a week I was allowed to sit up and wobble weakly to a chair, exhausted. A couple of hours tired me out completely, but the second time I stayed longer, and finally, with the nurse's help, I was walking around the corridor. The mask had been discarded, and first one pad went and then the other, and my sensitive eyes were protected from the light with dark glasses. The light hurt my eyes, which had been hidden from brightness by the pads and the mask; now I had to ease the glare with the colored glasses. Several days of wandering about the corridors of the hospital and a feeling of increased strength gave me an idea that I would soon go home.

On the tenth day of my hospital visit I started home. The ride was far different from the trip down to the institution, and I was in a rather joyful mood, realizing as I did that I should have sight and comparative normality in a short time. I still wore colored glasses, and while I could make out things fairly well, they lacked outline and definiteness, which only eyeglasses could supply.

Several trips to the doctor's office followed for the next few weeks, and finally, after a thorough testing with the eye charts, a prescription was given to me for reading and distance glasses. And here is where I met my real trouble. When I got the glasses, I was warned by the optician that I would have some difficulty in going about because of the powerful lenses, and I did have quite a time for about a week or ten days. As soon as I shifted my gaze from one given plane to another a feeling of dizziness came over me, so that I thought I was falling and sought some support. I felt very

insecure and was afraid to cross a street for fear I should suddenly have this dizzy sensation. This caused me to keep my head in a stiff, angular position, to avoid changing the plane of my vision. The sidewalks and the curbs were difficult to navigate and the stairs, especially the stone ones outside buildings, presented the most difficulty.

But gradually and automatically I began to judge distances and heights and measurements and to adjust myself to the new conditions. I made many ludicrous mistakes, knocking over cups of coffee, and missing the butter dish by at least six inches. Even this ceased, and once again movies and theaters received my attention.

As yet night presented some hazards, at least in my imagination, for I felt I would have a little trouble in crossing a busy corner. Still after a try or two even this disappeared and I began attending functions after dark, few, at first, but then a number of others. Crowds, because of my withdrawal from active life, caused some embarrassment, but persistence overcame this as well. And when I attended a banquet, making use of several means of conveyance, I felt that I had traveled a long way on the road to normality.

The most enjoyable of all the benefits conferred on me by the operation was the ability to resume reading; for I had found reading my chief pleasure from early boyhood. And so, with vision again possible, I have made full use of all that I missed so much when my eyes failed me. I am happy that through the skill of a fine physician, who devoted himself to my case, I can again take part in the world's affairs.

Eye Health in Teacher Education*

ANALYSIS of the present situation, together with recommendations of the Advisory Committee on Teacher Education, for the National Society for the Prevention of Blindness

Chairman's Foreword

The Advisory Committee on Teacher Education was appointed by the Board of Directors of the National Society for the Prevention of Blindness in the autumn of 1936, for the purpose of assisting in a study of the problems of eye health in connection with the education of teachers.

The work of the Committee, in its meetings and correspondence, has dealt mainly with efforts to get a clear picture of the extent and nature of eye health content in the professional curricula of colleges and universities engaged in the preparation of teachers. Through visits to a limited number of institutions educating teachers, the Committee Secretary has assembled a fund of information related to the problems. This information has been supplemented through correspondence with a larger group of colleges and universities. In the light of these data, the consideration of which has been limited to the brief annual meetings of the Committee and to some efforts to secure group thinking through correspondence, the Advisory Committee offers the following statement for the consideration of those engaged in the preparation of teachers. It is hoped that its reading will arouse interest in this field of work and show the possibilities of making a significant start in this important field of service.

* This statement grew out of the deliberations of the Advisory Committee on Teacher Education for the National Society for the Prevention of Blindness and the investigations of Dr. Anette M. Phelan, Secretary of the Committee and Associate in Health Education. It was incorporated in a report by President G. A. Selke to the American Association of Teachers Colleges at its meeting in Atlantic City in February, 1938, and appears in the 17th Yearbook of that Association.

The Present Situation

For 70 years educators have been giving some consideration to the vision problems of school children. The attention seems not to have been continuous, nor to have made any lasting impression on the education of teachers. Contributions of pertinent information discovered in laboratories of medical research, physiological optics, or engineering have not found their way, to any extent, into curricula for teachers.

In the years following the World War attention to teacher education, so far as eye health goes, centered on the professional preparation of special teachers for sight-saving classes, organized for children with seriously defective vision. The emphasis was almost wholly on remedial measures for a relatively small group—1 in 500 of the school population. Out of those experiences, however, has come a widespread appreciation of the significance of classroom illumination to the child's visual efficiency, comfort, and eye health.

Recent inventions again have turned the attention of school people to the possible relationship between vision and learning. But the newly invented instruments for the study of vision cannot be used satisfactorily without a clear understanding of the fundamental problems of eye health. Most classroom teachers today lack the background of information essential to such an understanding.

Evidence of Need for Attention to Teacher Education*

A survey of teacher practices indicates that the average teacher does not recognize the obvious individual differences in children's vision; that he is unable to check his observations with a simple test; and that he is oblivious to the classroom adjustments necessary to safeguard the eye health and efficiency of children. Among conditions revealed in the survey and reflecting a lack of appreciation of important factors in eye efficiency and health the following are suggestive:

> Classroom window shades usually drawn to cover the top half of the window.
>
> The space near the window utilized for fern stands, tables

* The survey and inquiries yielding the data were made by Dr. Phelan.

and lockers, with children's desks arranged on the dark side of the room.

Desks arranged in hollow squares with some children working in their own shadows, others facing a sunny window.

Nearsighted children seated in the rear of the room.

Children showing effects of eyestrain seated in a poorly lighted part of the room.

Children rated on intelligence or achievement on the basis of paper and pencil tests taken in poorly lighted sections of the room, and without an investigation of the vision status.

Young children in the first grade subjected to drills on quick recognition of symbols and words on the printed page, or imbued with a sense of failure over the inability to meet artificial reading standards set for promotion to the second grade.

An objective test on the eye health of school children given to 1,200 senior students in 20 institutions preparing teachers reveals that less than half the students have the fundamental information on eye health needed by any teacher.

An inquiry regarding the curriculum offerings in eye health was sent to 62 universities. Forty-two responded. Of these, one-third reported no offerings; one-third offered one unit, and the remaining third offered two or more units in eye health. In the last group, only eight universities devoted more than two semester hours to the subject.

Committee Recommendations

Institutions engaged in the preparation of teachers should give serious consideration to the content on eye health in the professional curricula. The required units of all curricula for teachers should include provision for meeting at least the following three needs of classroom teachers for:

1. Fundamental facts on the eye health and efficiency of children; opportunities for learning to recognize obvious individual differences in children's vision; ability to check his observations with a simple test, and to make the schoolroom adjustments necessary to meet the needs revealed by observation or test.

2. An understanding of the significance of the biological facts related to visual acuity, eye co-ordination, and growth of the eye; and the elements, including the curriculum, which may influence visual efficiency or the normal processes of growth.

3. The basic facts on the hygiene of classroom lighting, including the factors influencing adequacy of illumination and glare; and experience in determining classroom adjustments needed for eye hygiene.

Providing satisfactorily for the education of teachers in eye health presents some complicated problems. The range of fundamental information involves many fields, such as, ophthalmology, physiological optics, growth and development, physics, general science, school organization, and psychology. For this reason the student needs cannot be met adequately in one college department.

The needs for faculty education are imperative if the information gained in any department is to have a chance to function in the daily life of the student. There are common needs for adequacy of light and for protection from glare. Reliable research laboratories have furnished basic pertinent facts. These facts are needed alike by faculty members and students.

The need for functional information has not been met adequately by the lecture method, but seems to call for practical first-hand experience in actual school situations. For example: prospective teachers need to master the simple skills necessary to discover eye health problems in the classrooms. These skills call for an opportunity for actual practice with children not always available in connection with the professional curricula of institutions educating teachers.

Reports of educational investigations on the influence of vision upon the child's development, achievement, or school progress have been voluminous. The evidence offered is not always convincing, but points to a need for a critical summary and evaluation of data. Such an evaluation should reveal specific questions to be answered by further research.

A careful scrutiny, comprehensive in scope, of current practice could be expected to disclose approaches, content and organization of permanent value. University and college courses on eye health

of school children and eye health in teacher education might be evaluated on the basis of the functional information and profitable experiences included. Not only might the evaluation of such efforts serve the institutions where the offering is made, but the results might well be shared with universities and colleges having in mind the introduction of units of work on eye health in the professional curricula.

Commercial enterprises will likely continue their contributions in equipment. To be of greatest value these contributions should be accepted tentatively for experimental use and evaluation, and recommendations for their widespread use should follow rather than precede a reliable evaluation.

Research and medical organizations and educational agencies have obligations to discover or disseminate authentic information related to eye health, and to review basic facts periodically in order that institutions may have readily available the best recent information bearing on the problem. However, the responsibility for initiating any enrichment of curricula with regard to their treatment of eye health lies with the institutions themselves.

The decision by an institution to offer a program of instruction in eye health is one thing. It is quite another to secure the placement of the essential units on eye health in the various departments able and ready to accept responsibility for them, and to secure the assignment of the units to instructors qualified to present them to prospective teachers. Such a co-ordinating function within the institution is fundamental to a sound progressive program of instruction which will avoid the gaps and duplications characterizing the present situation.

It seems logical to suggest that, in each institution preparing teachers, some one person with an intelligent and sympathetic understanding of eye health problems of school children should be assigned the responsibility of securing a well-rounded program of eye health, including an intelligently selected eye health content, and providing for a co-ordinated program of instruction through co-operation of all the departments and instructors concerned.

Vocational Guidance for Sight-Saving Classes

Marie C. Kniewel

ALTHOUGH due emphasis must be placed on individual handicaps or capacities, the sight-saving class pupil should be given as wide a vocational choice as possible

THE problem of vocational guidance for sight-saving class children must be discussed from at least four viewpoints: first, with regard to the aims of the special education which these particular children are receiving; second, from the viewpoint of the individual responsible for this guidance—the sight-saving class teacher, and her preparation for such work; third, from the viewpoint of the individual child—his characteristics, his abilities and disabilities, his likes and dislikes, his educational possibilities, his home environment, etc.; and, last, from the standpoint of the vocations which are actually available to persons with less than normal vision.

Vocational Limitations of the Visually Handicapped

When we keep in mind the specific aims of the education of the low-vision child, we see that the problem of vocational guidance is not at all simple. When we consider that we must make these children capable of conserving their vision, we find that the choice of vocations for them becomes more or less limited, depending, of course, upon the individual eye difficulty, and upon the ingenuity of the teacher who is handling the problem. If she is over-emphatic in her consideration of this aim, she may unnecessarily limit the field of vocational suggestion in guiding her pupils. Again, if she is not sufficiently informed concerning a great number of possible vocations and their relation to persons with low vision, or rather

their possibility of pursuit by such persons, she will be too limiting in her guidance, and her program will be one of too many don'ts, unnecessary don'ts, harmful to the welfare of the child. On the other hand, if she sways to the other extreme, not giving enough care to the problem of conservation of vision, her vocational suggestions will be of no value to her students, and will defeat one of the essential purposes of the sight-saving class.

Class Discussions of Suitable Vocations

What, then, can she do? She can make the problem of conservation of vision an integral part of the problem of vocational guidance. She can say: "Let us discuss various vocations, careers, in which the pupils are interested; but let us, in each case, determine whether or not this specific vocation is one in which the individual might earn a living, *without impairment of his eyesight.* We must consider not only eyesight, but other necessary physical qualities, mental qualities, interests, etc." Of course, the teacher herself must have a wide range of information concerning such vocations. Therefore, she should avail herself of the vast bibliographies prepared by such agencies as the National Occupational Conference, the *Vocational Guidance Magazine,* and others. Then, too, the teacher must make available to her students information concerning certain vocations, in order that they may be enabled to discern their own fitness for various careers and also that they may ascertain which vocations are best suited to their individual needs.

Positive Vocational Advice

In a consideration of the next of the major aims of sight-saving education, namely, to provide pupils with the opportunity of making normal school progress, we are more concerned with the teacher's methods and means of directing and suggesting vocations for her pupils. Thus, since she has before her the immediate aim of keeping persons with low vision as nearly normal as is possible, she must ever be wary of giving negative vocational guidance—she must watch out for her possible don'ts and substitute positive suggestion in place of these harmful don'ts. She must minimize rather than emphasize the children's eye defects, without, however, forgetting the actual existence of such defects. She must, in short, be

a good psychologist: she must know her pupils thoroughly and then give guidance in the light of this knowledge, with as much tact and skill as she can bring to the task. So far as possible, she should see that these children are given such vocational guidance as is available to children in the regular classes; that they enter the discussions of the normally seeing children on this vital question; and with her guidance, particularize these discussions only from the standpoint of eye hygiene—which should come as a normal contribution on their part.

The next aim of the sight-saving class is definitely one of positive vocational guidance—such that it will enable the individual to choose a life work, if possible; such that he, consequently, will be enabled to occupy a useful place in the community. Formerly it was thought that the visually handicapped person could not lead a normal life, but now we have accepted the idea of fitting him into a normal place in the community—making him a worthy citizen, a capable citizen, independent, free, despite his low vision. Hence the actual guidance which he receives must be quite accurate, if it is to help him fit himself for this position. It must, without placing too much emphasis upon his handicap, take it into consideration, and at the same time make him feel that, as an individual, he can derive real joy and satisfaction from his chosen vocation. It must, in short, offer him the prospect of a normal chance for success and independence, equal to that of his more fortunate neighbors.

It is but reasonable to assume that the teacher, since she is to be a principal factor in the vocational guidance of these particular students, should have some equipment with which to work. That is to say, she must be acquainted with the problems of vocational guidance in general, and must also be able to apply these to the special problem of educating the visually handicapped. It is, perhaps, rather fortunate that not much has been published on vocational guidance specifically designed for persons with defective vision, for if our aim is to give these persons as normal a development and education as is possible, it seems the best way to do so is to use as our source of information and aid, the literature published for the guidance of normally seeing persons—always, however, remembering that some allowance must be made for the particular defect in each child.

Sources of Vocational Information

Perhaps the best timely source of information is the well-known magazine, *Occupations* (formerly called *The Vocational Guidance Magazine*). This publication, in addition to publishing articles on all phases of vocational guidance, reviews new books on vocations, vocational guidance and vocational research, and often lists valuable bibliographies on specific vocations, as well as general bibliographies. One of the most interesting of all these is the one called *Books About Jobs, A Bibliography of Occupational Literature,* by Willard E. Parker. This is the most complete work of its kind ever assembled; it contains a list of over 8,500 titles selected from the publications of the 15 years preceding 1935. The books are classified by occupations, and very carefully annotated. Surely such a work would prove valuable to any guidance director, and especially to the sight-saving class teacher, who might not know just where to find certain information about a particular vocation.

Of course, it is not to be assumed that the sight-saving class teacher should merely direct the student to such a bibliography, nor even to the books themselves, but rather that she herself should use such a bibliography intelligently, and make the desired information available to the students in the best sight-saving manner. Again, it must always be remembered that, because of the nature of the sight-saving class itself, a program of vocational guidance must not entail a great deal of outside reading. These books are to be used merely for information, if possible directly by the teacher, who relays the information to the pupils. When the teacher herself is equipped with information concerning a specific vocation, she can help her pupils to help themselves by initiating oral discussion about the vocations with which they are particularly concerned.

Sight-Saving Class Pupils as Individuals

If the sight-saving class teacher is to be as well prepared to give vocational guidance as she is to do her regular teaching, she must be capable of keeping constantly in mind the individual differences of her students. This emphasis on the individual must always be present in any form of guidance, and particularly in the guidance of the partially sighted. The first duty, then, of the sight-saving

class teacher is to know each of her pupils thoroughly. This knowledge must include an accurate knowledge of his eye defect, his physical condition in general, the possibilities of improvement or progressiveness in any physical disorder, his mental capacity, his emotional and personal limitations, his ambitions, his likes and dislikes, and his home conditions. Then, any guidance which she gives must be individual and, of course, objective. Whenever she discusses a certain vocation with her pupils she should be primarily concerned with the potentialities of the individuals she has in her class. She should not think "What are the vocations for sight conservation pupils?" but, rather, "How can sight conservation pupils adjust themselves to the vocations in which they are interested?"

Cultivating Wholesome Attitude toward Various Occupations

Keeping in mind the fact that she has to deal with children whose abilities, difficulties, habits, achievements, etc., vary greatly, the sight-saving class teacher would do well to teach her students very early in their school life a wholesome respect for all types of work. She should never, for example, show preference for the professions. Her own attitude toward occupations may easily be copied by the children, and for this reason she must be careful in appraising certain vocations. She will do well to discover early the child's potentialities, and if she finds that he is more likely to succeed in working with his hands rather than with his mind, she will guide him very early into such work. Above all, she should strive to develop in each child the correct attitude toward various vocations. This attitude is most important later, in the actual selection and placement in an occupation. Even if a child is mentally slow, there is always some vocation in which he can be successful. He should not be made to think that he is a failure simply because he cannot enter a profession. All work is honorable, provided it is honest endeavor to earn a livelihood. Furthermore, all kinds of work are necessary in our complex life. And no vocation should be frowned on, so long as it contributes in some way or another to the welfare of the community. Children with low vision and slow mentality should be taught to regard vocations rather from the viewpoint of giving service to humanity than from the viewpoint of the dignity

or lack of dignity of these vocations. They should acquire the attitude that doing any task well, even though it may not require mental gymnastics, *is* being successful.

Analyzing Personal Qualifications of Pupils

While the setting up of good attitudes toward vocations is a large part of the task of vocational guidance, some more or less formal study of vocations should be given to sight-saving class children, either in the intermediate grades or in high school. One of the best methods presented for some such program, which may be readily adapted to the sight-saving class, is the method outlined in "A Mirror for Students," an article by J. Harold Brennan in volume 13 of *Occupations*. Mr. Brennan would have the student rate himself on certain specified abilities as low, medium or high. Then the student may make three other such charts, rating himself on qualities of character, physical qualities, and, finally, qualifications of training which he already has or hopes to acquire. Next the particular occupation is studied with regard to these various abilities, character qualities, physical qualities, and training qualifications, the aim being to discover which of these particular abilities are necessary, which are desirable for the pursuance of the particular vocation. As each vocation is studied and the desirable and necessary abilities and qualities decided upon, it can be added to the chart and the recordings made for the benefit of the entire class. Finally, at the bottom of the chart some indication can be made of the comparative number of workers engaged in each of these occupations in the local community, and thus some possibility of placement can be made available to these future job-seekers.

Perhaps this formal study seems too involved for a sight-saving class program. Yet, when it is remembered that we are trying to make the education of these people quite normal and trying to tie it up with sight conservation, this method seems very usable, particularly because it makes the individual gauge himself with regard to his vocational possibilities. Finally, it does take care of the visual requirements without making them an abnormal issue—inasmuch as they are taken into consideration along with other physical requirements.

Editorials

Ellice M. Alger *

WE ARE come here this day to honor, by the presentation of a medal, the man Ellice Alger.

In our weakness of expression we offer this token of honor to one whose own works have builded a better monument and a more enduring emblem by the deeds of his own hand, by the products of his own mind, and by the charity of his own heart.

The ophthalmic scalpel and the healing collyria are but the symbols of his efforts. His good deeds perpetuate themselves through printed vellum and are propagated forever in the trained minds of two generations of ophthalmologists whose professional infancy he has nurtured to a sturdy manhood.

Professor Alger has taught me the best of ophthalmology, though I have never been under his direct instruction; and this is no paradox to those of us who have known him. I do not mean that his teachings have reached me through his writings alone, nor do I mean through his spoken word, to which I have often listened in the formal gatherings of medical men. I mean he has taught me as he has taught others by the human friendliness of his ophthalmic interest, and by an example which is one of service, far set apart from those sordid meannesses of a fast-moving commercial age.

One of my early professional pleasures was the reading of Dr. Alger's papers, and they made me want to know him. I think such an urge—"to know him"—is the one worthwhile impression I should like to leave in the hearts of the young men over whom I preside. I felt it a particular compliment the other day when one of the younger men of ophthalmology came to me with Dr. Alger's book in his hand. He wanted to know if we could not adopt it as our standard for study. He had stepped along with me to become a perpetuator—a gene—of Dr. Alger's labors. He, too, wanted to meet Dr. Alger. I can see as time goes on a never-ending stream of

* Speech delivered by the author in presenting the Leslie Dana Gold Medal to Dr. Alger during the 1938 meeting of the National Society for the Prevention of Blindness.

Dr. Ellice M. Alger receiving the Leslie Dana Gold Medal for "long meritorious service for the conservation of vision in the prevention and cure of diseases dangerous to eyesight, and for research and instruction in ophthalmology and allied subjects," from Dr. John N. Evans, member of the board of trustees of the Association for Research in Ophthalmology, who made the presentation address, appearing herewith.

disciples following the pen and word of Ellice Alger; propagating forever his teachings for the prevention of blindness and the good vision of mankind.

Dr. Alger—in the name of the Association for Research in Ophthalmology and the St. Louis Society for the Blind, I present you with the Leslie Dana Gold Medal for your "long meritorious service for the conservation of vision in the prevention and cure of diseases dangerous to eyesight, and for research and instruction in ophthalmology and allied subjects."

—John N. Evans, M.D.

New Section for the Review

TO AFFORD a closer working relationship with local and state groups throughout the country, directly or indirectly engaged in activities for the conservation of vision, we are planning a new department in The Sight-Saving Review which we hope to introduce in the March, 1939, issue. This section will contain news of program developments of various organizations. In order that the material may be useful to all engaged in this field, medical societies, local prevention of blindness agencies, educational groups, Lions Clubs, Parent-Teacher Associations, and individuals engaged in prevention of blindness activities, are asked periodically to furnish the Society with comments on their sight conservation activities.

The Forum

THIS section is reserved for brief or informal papers, discussions, questions and answers, and occasional pertinent quotations from other publications. We offer to publish letters or excerpts of general interest, assuming no responsibility for the opinions expressed therein. Individual questions are turned over to consultants in the particular field. Every communication must contain the writer's name and address, but these are omitted on request

A Word to the Wise—About Eyes*

We older people who lived the greater part of our lives in horse-and-buggy days can't advise a modern boy how to ride a bicycle among speeding motor cars—we'd only beg him not to—and we can't tell him how to save his life from all the other deadly contrivances that we ourselves invented for his betterment. But there are some old perpetual perils upon which we are competent to speak. We are competent because—though we once said, as the boy says now, "That won't happen to ME!"—we've had time to discover what we did to ourselves.

In a scuffle the other day my great-nephew, George, got a black eye and told me it amounted to nothing; he'd had another just before this one. As he spoke, he was gouging at his other eye, corkscrewing his knuckles into it as if to excavate it. "Eyelid itches," he explained.

I recommended a different remedy and added: "If I were you, I'd avoid being hit in the eye by either a ball or somebody's fist, George. Did you ever hear of a detached retina?"

"No, sir. You don't want me to be a sis, do you?"

"Sometimes it's useful," I told him, and, as he still gouged at his eye, I suggested an object lesson. "Get a toughish young green plum, George. Do to it what you're doing to your eye; then open the plum and see what you've done to its inside."

He laughed. "Oh, you can't hurt my eyes!"

"No? They're indestructible—like mine?"

"Well—you know you're kind of

* Reprinted, with permission, from the October 1938 issue of *Good Housekeeping*. Original title: "To Whom it May Concern."

old, sir. I don't care what happens to me at your age."

"It's too bad," I said, "but you will, George. You haven't tried it; but I have, so I know. About your eyes, now, for instance, let's try something. Try being blind, George."

"All right." He shut his eyes, groped with his hands, took two steps, and touched a chair. "Oh, I guess I could get around!"

"Yes, George; and you might be lucky enough to get a Seeing Eye dog, and he'd keep you from bumping into things; and you could learn to read Braille and how to eat—"

"Eat?" he cried. "Trust me! Blind or not, I could always eat!"

"Could you?" I asked. "I'll give you that fishing rod you yearn for if you'll eat your dinner blindfolded so that you can't see at all."

George was delighted, and, at the dinner table he at first thought the experiment great fun; then he didn't. "Ow!" he said later. "That's the only bite I've got all the way to my face, and I loathe eggplant! I thought it was asparagus."

Afterward I heard him raking the refrigerator for cold food.

"Murder!" he said, when I joined him. "I'd hate to be blind. How long does it take 'em to learn to eat?"

"I don't know, George. You see, I was totally blind only a few months."

"Listen! What was all that about me not getting hit in the eye or gouging or—"

"Or reading in a bad light and some other things?" I added. "The eye is a delicate object, George," I said—a sententious old truth; but I'd had the misfortune to discover its meaning for myself.

Booth Tarkington
Indianapolis, Ind.

The Leper Colony on Molokai*

Up very early this morning. I am taking a six o'clock plane for the settlement of Kalaupapa, the leper colony on the island of Molokai. So many of the lepers are blind, so many have eye difficulties, that I have been invited to go to the colony to get some idea of conditions there. Last night I begged a thermos bottle of coffee and drink this as I dress; I must leave at 5:30, since the airport is a distance away. The sun has not yet climbed the mountains when we leave. We pass the fishing docks, where the sampans, painted blue for the protection of the Virgin, are returning from their night expeditions and drawing near with their catch of fish. Armed with credentials, we board the plane, for it seems much harder to get into Kalaupapa than to get out. The small special plane carrying six passengers is full and the pilot is already calling for "contact." The wings spread out over the sleeping city as

*Excerpt of a letter from Hawaii.

we rise high in the air. Everything below looks so tiny, like a child's toy city.

Soon we leave the headlands of Oahu behind and head toward Molokai. In 45 minutes we land on a peninsula jutting out into the water against a background of jagged cliffs that divide the settlement from the rest of the island of Molokai, which is given over chiefly to the raising of pineapples. The only connection is a perilous trail leading down the precipitous side of the cliff. There is a gate at the top, over which a watchman always keeps guard, for lepers may not mix with the general population.

I am not at all clear as to what I expect to find, possibly something horribly abnormal and morbid. I recall the story of Naaman and the curse of leprosy which made the victim "white as snow." But, just as at any other airport, we are met with cars, the resident superintendent is there to welcome us, and we are immediately taken to staff headquarters. The superintendent and many of the nurses live at headquarters within the special enclosure and here, also, the doctors have their own homes. The "sisters" have a home in one "unit" and the "brothers," in another.

We have breakfast at headquarters, bacon and eggs and toast and coffee, just as in any ordinary home, and then we visit the various "units." There are no children at Kalaupapa; those with leprosy (and three were found in one school last year) are kept in the detention settlement for lepers on Oahu. But it is sad beyond words to see so many young people, boys and girls of 17 and 18. Under the management of the new director there are many new attractive buildings, and the system followed is on the cottage plan. The girls live in a unit directed by the sisters, and the boys in one directed by the brothers, although the conduct of affairs is non-sectarian.

As we near the sisters' unit we see a delightful white house, low and rambling; there is a pergola in front covered with crimson bougainvillæa flaming against the white of the building and the green leaves of trees and shrubs. As we draw near a sister in a white coif and a white gown comes down the steps and out under the pergola. It is a beautiful picture of peace and restfulness. The house is enclosed by a low fence which the "unclean" do not pass. The sisters go to their charges but the homes of the latter are just as pleasing. Each girl has her own room, adorned with her own possessions, all immaculately cared for. Somehow the terrible deformities caused by the disease sink into the background, for all are busy and apparently happy, and the desire to live is just as strong as in the average human being.

The territory supplies everything—medical service, housing,

food, clothing, and a small amount of pocket money. If anyone wishes to work, he or she may do so and be paid regular wages. Each unit has its own kitchen and dining-room and there are many churches, representing all the various sects from Catholic to Mormon. The Japanese have their own services and feast days; so do the Chinese and the Hawaiians and the Filipinos and the Samoans. Most of the work undertaken is agricultural, fishing, chicken raising, or bee culture. There are many recreation centers, and altogether it is about as normal a community as one could possibly find.

There are about 430 patients and 100 staff members. Only about 40 are hospital patients; they are in the worst stages of the disease, but they still smile (if there is a mouth left capable of smiling, or eyes that can see to smile). The doctors, nurses, attendants, and patients are all gracious and gentle. We do not stay long in the hospital, for despite the smiles, the effects of the disease are terrible to behold—how much more to suffer! The patients are not allowed to touch the "clean" but they are always pleased when the few visitors who are allowed come without gloves. All visitors are warned, however, not to touch railings or chairs or utensils used by the patients. Yet there is a history of a man sent to Kalaupapa 32 years ago with this disease. His wife decided to go with him. They have lived ever since in one of the cottages and she has never developed or, indeed, shown any sign of the disease. Just what it is and whence it comes are still mysteries.

We go to the brothers' quarters. Here is a beautiful rock garden abounding with flowers, and high up on the slope a tiny shrine with its sweet-faced Madonna. The old people and the blind prefer to remain in the earlier buildings; when the years are many or the eyes can no longer adjust to new surroundings, familiar things are best. The director has given regard to their wishes, but has joined two houses for the blind with a long lanai (a kind of broad piazza), so that they may walk at ease, if, indeed, walking is possible, for the disease frequently affects the feet. There are devices for occupation and enjoyment, among them a talking-book, but they cling mostly to the things of other days, so one of the young girls is reading aloud.

In the afternoon we drive across the little peninsula to the site of the first leper colony on Molokai. It is a beautiful spot, with Father Damien's chapel and the adjoining churchyard, where he was buried. But recently Belgium requested that his remains be returned to his homeland. The Territory responded to this request although it was felt by many that he would have preferred to rest among those with whom he had lived and worked for so many years. It was in this little

chapel that he stood up the Sunday after he discovered he had contracted the disease and began his exhortations with "We lepers." This side of the peninsula is far more attractive than the present site of the colony, but is much damper and colder, and because of interference with circulation, the leper is hypersensitive to cold. On this July day it is difficult to imagine anything cold, for the heat is so intense it is a comfort to get under the shade of the great trees.

The people of the colony travel all over the peninsula except in the enclosure for the clean; we met a truckload of men and women going on this Saturday afternoon to work at Father Damien's park, a project they have undertaken of their own volition as a labor of love and appreciation, and later saw them when they had built a fire and cooked their lunch. It was just like any other picnic; they were singing and laughing as they ate and worked.

We learned that a few in the colony recover sufficiently to return to their homes, but they almost invariably return within a short time. Those with whom they come in contact fear contagion (although patients are paroled only when the disease is in a non-communicable stage). In other cases the deformity resulting from the disease makes them objects of curiosity or makes it impossible for them to get a job, so, as they say, they "turn homeward toward Kalaupapa"; and we, too, turn homeward, for the plane cannot wait. Here it is on the flying field and we wave "good-bye" to new friends, carrying with us a very different conception from that of our outward journey. We travel westward into the setting sun; Molokai grows smaller in the distance, and the headlands of Oahu rise up against the sunset. We say little, for what is there to say? Here we are over Pearl Harbor; the plane is gradually coming to earth. We take up ordinary life again and perhaps we wonder why we ever complain about so many little things when those others face the tragedy of a living death with a smile.

WINIFRED HATHAWAY

Reading as a Visual Task*

The printed page is read ordinarily without thought of Gutenberg, who invented printing; of Mergenthaler and others who mechanized its production, or of the uncounted designers and typographers who advanced the art by empirical steps. To most readers the printed page appears to be merely a simple reality and the act of reading is so commonplace that it does not even occupy the consciousness. But the foregoing two sentences represent

* Reprinted, with permission, from August, 1938, *Booklist*, published by the American Library Association.

respectively two hidden chains of events which are of great importance to the welfare of readers. Since Gutenberg, civilized human beings have become enslaved by the shackles of near-vision, performing critical seeing of prolonged tasks within arm's reach. Among the countless unnatural, prolonged, critical visual tasks that have been introduced into our artificial world, reading is of universal and overwhelming importance. As such, it is an appropriate subject for research and analysis by modern science. The chain of events from this printed page to the final perception and retention involves a complexity of vision and of seeing. In this chain, and diffusing from it, are many hidden physiological effects involving eyesight, energy, fatigue, and far-reaching effects. Here is a realm of particular interest to the reader because of its intimate relation to human welfare.[1]

Much research has been devoted to reading, but most of it has been handicapped by inadequate criteria and technique, and by inadequate knowledge of what reading is as a visual task and how it is affected by various components. Our researches over a period of a quarter of a century eventually developed a proper concept of seeing as distinguished from vision. Reading was naturally used as a task in many of our researches, with the result that we have achieved a specially intimate and extended view of it as a task, and have revealed various effects of reading which had been previously hidden. Much of this is co-ordinated in a recent volume.[2]

Superficially, reading matter is considered largely from the viewpoint of size, design, and leading of type. In the absence of suitable criteria and devices for easy measurement, typographers have had to rely upon experience and judgment. As a consequence, esthetic considerations have often been too predominant. From the viewpoint of vision it is very important to realize that reading involves prolonged near vision, which is unnatural from the viewpoint of evolution of eyesight and life. Also, in the artificial world in which we live, the level of illumination is unnaturally low from the viewpoint of adaptation to environment outdoors where eyesight and living things evolved. Ordinarily the brightnesses of areas of landscapes which are pleasant to look at outdoors are a hundred times brighter than this printed page where it is commonly read indoors. In addition, it has been adequately proved that the visual sense is most efficient or sensitive at brightness-levels a hundred times higher than the printed pages are when viewed or read in libraries,

[1] Luckiesh, Matthew: *Seeing and Human Welfare*, Baltimore: Williams & Wilkins, 1934.

[2] Luckiesh, Matthew, and Frank K. Moss: *The Science of Seeing*, New York: Van Nostrand, 1937.

offices, and homes. Still, many researches in reading have been prosecuted without any realization of the fact that the illumination of the printed page is just as much of a factor in the visibility of the type as the fixed factors, such as type-size.

After many years of research in seeing we have come to look upon the visual task of reading as one primarily of visibility and ease of reading. The former applies to the reading matter and the latter to the reader. Visibility is affected by the design and size of the type, the contrast between the printed matter and the paper background, the level of illumination, and the environment with its possible distractions. All these affect the readability and the reader by influencing ease of seeing. Thus the visibility of the printed matter is all important in analyzing the visual task, and also becomes very important as an indicator of readability or ease of reading. The Luckiesh-Moss Visibility Meter is now doing service in this respect.

Some idea of the effect of type-size (of a given style) and illumination (measured in foot-candles) is readily gained from the fact that the visibility of 8 point type is equal to that of 12 point type of the same style, provided the former had twice the amount of light on it, that is, was illuminated by twice the foot-candles. This does not necessarily mean that the smaller type, even when raised to the same visibility, is not still more difficult to read than the larger type.[3]

Another interesting comparison may be made of type faces and visibility. Of twenty 8 point type faces studied, the one of lowest visibility had a visibility only two-thirds that of the one of highest visibility. This means that the former had to have nearly three times the illumination of the latter to make it of the same visibility. If the differences in visibility of these so-called 8 point types under the same illumination are expressed in point sizes which would make the two extremes equal in visibility, the one would have to be about 9 point and the other about 7 point.[4] From these glimpses it is seen that there are several variables which can be measured and correlated. Furthermore, it is nothing short of ridiculous for anyone to make a sweeping generalization as to the best type face, type-size, or illumination for reading.

In addition to the foregoing there is the matter of ink, paper, and printing. The same type face may be of much lower visibility if the paper or the printing is poor than if they are of the best quality. For example, the printed matter in a telephone directory was found to require three times the illumination

[3] "How Much Light for Reading?" *Journal of the American Optometric Association*, Vol. 7, 1936, p. 18.

[4] "The Visibility of Various Type-Faces," *Journal of the Franklin Institute*, Vol. 223, 1937, p. 77.

to render it of the same visibility as when well printed on white paper. This is largely due to the decreased contrast in the former case.

This factor is also involved in the use of tinted or colored paper. Any paper with even a slight tint has a lower reflection factor than the best white paper. Therefore, visibility of the printed matter is lower when a tinted paper is used. In an investigation[5] we found no evidence of greater readability or ease of reading for print on yellowish tinted paper when compared with the same print on a white paper. There was definite evidence that readability of the same print on yellow and red papers was measurably less than on white paper. The readability decreased as visibility decreased when the printed matter on the various papers was illuminated to the same foot-candle level.

At this point we might glimpse some of the criteria used. For many years it has been assumed that the rate or speed of reading is an appropriate method of measuring readability or ease of reading. We have shown by many researches extending over various visual tasks that the rate of doing work, such as the number of words or pages read in a given time in the case of reading, is not a reliable measure of ease of reading. This criterion is not sensitive enough to detect differences excepting in rather extreme cases. Readers develop habits and rhythms that do not change appreciably with relatively small differences in the actual visual task. Just as the brain is a taskmaster which demands that the heart do its job under widely different degrees of physical effort, it also demands that the eyes and visual sense do their job whether the visual task is easy or difficult. Within wide limits this is done with the result that reading will be done at nearly the same rate for two cases differing widely in difficulty. But this is done at the expense of the reader.

This led the writer and Frank K. Moss to develop some entirely new approaches, one of which aimed to measure physiological effects of reading and of other seeing tasks. We have measured tenseness, heart-rate, eye-fatigue, and rate of blinking due to reading. Some of these results have been well correlated with visibility measurements, giving an added significance to the latter which can be readily measured by our current technique. On the other hand, psychophysiological researches require many months of tedious work with many subjects.[6] We now have incontrovertible evidence that undesirable physiological effects are increased by factors and conditions which reduce

[5] "Visibility and Readability of Print on White and Tinted Papers," *The Sight-Saving Review*, Vol. 8, 1938, p. 123.

[6] "Reflex Effects from Critical Seeing," *American Journal of Ophthalmology*, Vol. 18, 1935, p. 527.

the visibility of printed matter. This is a much more appropriate approach to the problem of readability and ease of reading than previous methods.

Of all these new criteria, we have studied rate of blinking for the greatest variety of reading tasks. The reflex blink is a phenomenon associated with tenseness and apparently is a relief mechanism. We have found that this criterion distinguishes between the readability of type faces of the same size but differing in design so slightly that no one can determine by mere inspection or qualitative experience which is best. No other criterion has as yet been able to detect such differences in readability of type faces differing only slightly in design. The rate of blinking was found to be closely related to visibility. For example, when reading the type face of highest visibility the rate of blinking was lowest even for type faces of the same size.

The determination of the proper amount of leading generally has not been accomplished by measurement. However, we have found that the rate of blinking appears to be a promising criterion in this aspect of typography. For example, for reading a given 10 point type, the rate of blinking decreased markedly as the leading was increased from 1 point to 3 point. For 6 point leading it was not significantly less than for 3 point leading, indicating that the latter is a practical optimum for that particular 10 point type face.[7]

These are glimpses of the scientific approach to the important subject of reading. Much progress in understanding the subject is imminent. Certainly the science of seeing can make no greater contribution than to reveal the ways in which reading may be made easier, thus conserving eyesight, energy, and other human resources. Doubtless, most readers are not interested in the scientific aspects of the visibility of reading matter and of the complex psychophysiological effects of reading. However, it must be interesting to know that the empirical practices of type-designers, typographers, printers, and publishers are bound to be reinforced or remodeled by results obtained by new criteria, technique, and concepts of seeing. The reader should be aware of the fact that the visibility of printed matter is not merely fixed by the typography—type face, type-size, leading, length of line, paper, and printing.

By increasing the level of illumination, visibility and readability or ease of seeing increase just as definitely, for example, as it the typographer increased the size of type. Most printed matter is read indoors under a few foot-candles. We have definite evidence that readability or ease of reading increases as the

[7] "Effects of Leading on Readability," *Journal of Applied Psychology*, Vol. 22, 1938, p. 140.

illumination is increased up to and beyond 100 foot-candles. This is true for 10 point and 12 point type that can actually be read under a fraction of a foot-candle. Thus light is a factor just as definite in its contribution toward readability as eyeglasses are. In addition to this, the requirements of reading and the age and ability of the reader are important. Proofreading is a far more difficult task than mere reading for the sense or story. All these factors, of which only glimpses can be given in a brief article, constitute a complexity which is unappreciated by those who make generalizations or sweeping statements as to what type size is enough, how much light is enough, etc. Ideal conditions are the result of maximal contributions by all factors and aids to seeing. Only this is "enough." Obviously, costs of various factors must be taken into account but this cannot be done properly without knowing the benefits which these factors can bestow. Somehow we manage to justify the cost when we realize the benefit.

Matthew Luckiesh, D.Sc.
Nela Park, Cleveland, Ohio

Note and Comment

Model Eye Safety Record.—An excellent example of what can be done by proper safety measures is the record of the Hawthorne Works of Western Electric Company. In 1924, before safety measures were efficiently carried out, the company had 522 eye injuries causing time loss. In the subsequent years steps were taken to remedy this situation, with the result that the eye injury graph took on the form of a 1929 stock market record, hitting a low of one case in 1934 and no more than three cases in each of the following years.

Preventing Eye Accidents in Switzerland.—Since March, 1933, when systematic measures for the protection of workers' eyes were introduced by the Accident Prevention Service of the Swiss Federal Railways, the number of eye injuries has steadily declined. In 1937 the proportion of eye accidents in the entire workshop department was one for every 100,000 man-hours, as compared with 6.1, on the average, for the years 1929 to 1932.

Prevention of Ophthalmia Neonatorum in Illinois.—With the enactment in 1933 of a law requiring the use of a prophylactic in the eyes of every newborn child in Illinois, the State Department of Public Health made provision for the recording on each birth certificate of the use of such prophylactic. A study of 1937 birth certificates with respect to this record reveals that of 115,283 birth certificates filed, there was no record of a prophylactic application on 2,065; on 41 certificates the attendant reported that no prophylactic was employed; on 1,276 the preparation specified as having been used was not of an approved kind; the information on 1,412 certificates was not sufficient to give satisfactory information on what had been done. Forty-seven cases of ophthalmia neonatorum were reported; fortunately, however, prompt and vigorous treatment prevented the loss of sight in all cases.

Drugs and Cosmetics Act Safeguards Eyes.—The food, drugs, and cosmetics act recently passed by Congress makes the provision that any preparation for hair dye containing coal tar, which may

be injurious to the user, must bear the statement, "Caution: This product contains ingredients which may cause skin irritation on certain individuals, and a preliminary test according to accompanying directions should first be made. This product must not be used for dyeing the eyelashes or eyebrows; to do so may cause blindness."

Ophthalmic Surgery.—Transplantations from the eyes of human corpses always provide good copy for newspaper features, and hence are frequently given a disproportionate share of publicity. According to a recent article in the *American Journal of Ophthalmology*, however, the ideal material, especially for intraocular work, is the eyes of kittens from six to twelve weeks old. Monkey eyes, also are excellent for this purpose, but are too rare and expensive for ordinary purposes.

The possibility of successful surgery in cases of corneal transplantation is only fair, according to Dr. J. W. Tudor Thomas, associate surgeon in charge of the corneoplastic department of the Central London Ophthalmic Hospital. In a study which he has made of 56 operations performed since 1930, 62.5 per cent were successful. The failures were for the most part due to the fact that the eyes were "unfavourable." It is heartening to note, however, that operations performed since 1936 have been successful in 80 per cent of the cases, as a result of improved techniques.

Good Housekeeping for Goggles.—Realizing that goggles kept in tool boxes or bench drawers may become dirty and scratched, the American Optical Company at Southbridge, Mass., has designed flat wooden cabinets for storing goggles. Glass doors keep out dust and dirt. The goggles are hung on partitioned racks inside the cabinet, with each partition bearing the number of a workman. At the end of each working day the goggles are returned to the respective niches in the cabinet. Over the weekend they are thoroughly cleaned. The company has found that a careful scrubbing of the goggles in a hot solution of soap and water will remove dirt and other foreign matter that might cause skin irritations.

Causes of Blindness in England.—The thirty-second annual report of the Northern Counties Association for the Blind in England, presents an analysis of 10,000 cases of blindness, indicating that

6,406 cases were due to congenital or undetermined causes. Primary cataract accounted for more than one-half of such cases, and primary glaucoma, for one-sixth. The number of cases due to infectious and bacterial causes was 1,791, including 405 cases of ophthalmia neonatorum and 492 cases resulting from syphilis. Traumatic and chemical causes numbered 580, including 262 cases of industrial trauma and 286 non-industrial trauma (including 44 results of war injury). General diseases accounted for 800 cases, and no cause was known in 423 cases.

Lost: 1,000 Years!—A total of 313,953 working days was lost in Ohio industries during the year 1937 as a result of 44,876 eye injuries, according to the annual statistical report issued by the Industrial Commission of Ohio. One able-bodied laborer, working six days a week, would have to work over 1,000 years to accomplish the work that was lost through such injuries—many of which could have been prevented!

1939 Drivers See More.—The most important contribution to traffic safety afforded by the 1939 model cars is the greatly increased visibility for the driver. This improved visibility is obtained in two ways. First, glass area has been increased considerably and the width of the corner posts has been reduced. In one important line of bodies, for example, the front window or windshield area has been increased by 32 per cent and the total glass area by 27 per cent. Since a split second's difference in a driver's braking time may often spell the difference between an accident and a near-accident, this increased visibility should do much to cut down the number of accidents.

The Eye Generates Electricity.—The human eye is actually an electrical generator, according to Professor Walter R. Miles of Yale Medical School, who has discovered that the front part of the eye is electrically positive while the retina is electrically negative. Differences in potential, measured during a wide turning of the eyeball, range from .0002 to .003 volts for each eye. One eye may differ markedly from its mate; and minor visual defects seem to make little difference. That the eyeball itself, and not the surrounding muscle, is the source of the current, was demonstrated when the tests were checked on persons who had lost one eye. If

the eyeball is not there, no current is generated, regardless of whether the socket is left empty or filled with a glass eye.

Eye Protection for South African Welding Workers.—In order to protect the eyes of welding workers employed in South African mines, the Prevention of Accidents Committee of the Rand Mutual Assurance Co., Ltd., makes the following recommendations:

1. In Oxy-acetylene Welding.—Adequate protection for the eyes can be provided by using goggles with special light-absorbing lenses. The goggles should make a close fit to the eye sockets all round, so as to avoid rays or sparks entering around the frames. Proper fitting of the goggles is of the utmost importance. Helmets of an approved type are more satisfactory than goggles.

2. In Metallic Electrode Welding.—Approved helmets with light-absorbing glass, of a type which will absorb all ultraviolet radiation and at least 99 per cent of the infra-red. In addition each operator should be surrounded by a screen painted inside with a lead paint of a dark, flat color. Where others than welders are likely to come close to welding operations, their eyes should be protected with goggles.

Marigold Yellow for High Visibility.—Marigold yellow, technically described as 5-yellow-8-12, is recommended as the ideal color for the rear end of trucks, since it contrasts vividly with predominant landscape colors by day and night. A frame of jet black sawteeth provides color contrast against the yellow, as well as line contrast by presenting diagonal rather than horizontal or vertical edges.

British Minister of Health Appoints Advisory Committee on Blindness.—Note has been made of the appointment by the Minister of Health of an Advisory Committee on Blindness, including its prevention and treatment. The committee will carry on the work hitherto performed by the standing committee on the Prevention of Blindness of the Union of Counties Associations for the Blind, which has ceased to exist.

Myopia Increasing among Japanese.—Myopia has increased considerably in Japan during the last 20 years. A study of school children and students from 12 to 18 years of age shows that myopia

has increased from 15.97 per cent to 36.35 per cent among the boys and from 10.4 per cent to 34.56 per cent among the girls.

Changes in Examinations for Ophthalmologists.—The American Board of Ophthalmology announces an important change in its method of examination of candidates for the Board's certificate. The written examination, which will be held simultaneously in various cities throughout the country approximately 60 days prior to the date of the oral examination, will include all of the subjects previously covered by the practical and oral examinations. Oral examinations will be held at the time and place of the meeting of the American Medical Association and of the American Academy of Ophthalmology and Oto-Laryngology, and occasionally in connection with other important medical meetings; the examination will cover the following subjects: external diseases, ophthalmoscopy, pathology, refraction, ocular motility, and practical surgery.

The written examinations in 1939 will be held on March 15 and August 5. Oral examinations will be held in St. Louis on May 15 and in Chicago on October 6. Applications for permission to take the written examination on March 15 must be filed not later than February 15 with the secretary, Dr. John Green, 6830 Waterman Avenue, St. Louis, Mo.

National Society Notes.—As a result of the maintenance of exhibit booths during the annual convention of the American Medical Association in San Francisco last summer, approximately 200 doctors from all parts of the country registered requests for the Society's material and manifested an interest in the Society's work. A similar broad interest was indicated also by the registration for material at the Society's booth at the National Conference of Social Work in Seattle.

The summer course for sight-saving class teachers conducted by Mrs. Winifred Hathaway, associate director, at the University of Hawaii in Honolulu, prepared 24 teachers for this special work in Hawaii as well as in other parts of the United States. Mrs. Hathaway also visited seven islands in the Territory of Hawaii, where she made a survey of the work in sight conservation which has been carried on since her 1932 visit. The Forum section of this issue of the Review includes one of the letters which she sent from Hawaii, vividly describing one day's activities there.

Returning from Hawaii in August, Mrs. Hathaway stopped in San Francisco to study the sight-saving class work. During the fall months she has made field trips to Asheville, N. C.; Detroit, Mich.; Bethlehem, Pa.; and Washington, D. C., where she held conferences and took part in general meetings and institutes.

Lectures at summer courses for sight-saving class teachers were delivered by Mr. Lewis H. Carris, managing director, at several universities, including the University of Washington, Tulane University, University of Cincinnati, Wayne University, and New York State Teachers College at Buffalo. Mr. Carris also took part in the course on "Eye Health of the School Child," conducted at the University of California, in Berkeley, by Dr. Anette M. Phelan, associate in health education. During the fall Mr. Carris made two visits to Tennessee to help in the formulation of the state program for the prevention of blindness. He offered similar assistance in South Carolina, where a division of the social welfare board is charged with conservation of vision responsibilities.

During the early fall Dr. Phelan carried on her work with the Eye Health Committee of the American Student Health Association and its advisory committee of ophthalmologists. Since her marriage to Dr. William F. Watson in October, she has continued this work on a part-time basis.

At the request of the Ohio State Commission for the Blind, Miss C. Edith Kerby, statistician, spent two weeks in Ohio during September, where she revised the statistical reports of the prevention of blindness service of the commission.

During the summer and fall Miss Eleanor W. Mumford, R.N., associate for nursing activities, assisted in institutes for nurses in Chicago, Ill.; Denver, Colo.; Trenton, N. J.; and New Brunswick, N. J. In addition she participated in conferences on eye health in Hackensack, N. J.; Washington, D. C.; Greenwich, Conn.; Wilmington, Del.; and Philadelphia, Pa.

The Society has announced the appointment of a Nursing Advisory Committee, headed by Miss Katharine Tucker, professor of public health nursing in the School of Education, University of Pennsylvania. The Committee has been selected to represent the various fields in nursing, such as nursing education—graduate and undergraduate—and public health nursing in its many phases.

Each of the federal nursing services is represented by its director. In addition to Miss Tucker, the Committee includes: Miss Josephine McLeod, secretary-treasurer of the Virginia State Board of Examiners of Nurses, Richmond, Va.; Miss Ruth Sleeper, assistant principal, School of Nursing, Massachusetts General Hospital, Boston, Mass.; Miss Cora Shaw, Institute of Ophthalmology, Presbyterian Hospital, New York, N. Y.; Miss Naomi Deutsch, director of public health nursing, Children's Bureau, Washington, D. C.; Miss Pearl McIver, senior public health nursing consultant, United States Public Health Service, Washington, D. C.; Miss Elinor D. Gregg, director of nursing, Office of Indian Affairs, Washington, D. C.; Miss Mary B. Hulsizer, instructor in school hygiene, Board of Education, Newark, N. J.; and Miss Marguerite Wales, consultant in nursing education, W. K. Kellogg Foundation, Battle Creek, Mich.

The recent appointment of Dr. J. Warren Bell as medical director will enable the Society to co-operate more extensively with the medical profession and with local, state, and national health departments and associations. Dr. Bell, who holds the degrees of B.S., M.D., and Ph.D. from the University of Minnesota, was formerly director of Maternal and Child Health in Nebraska, and prior to that was director of the Division of Maternal and Child Health in Cattaraugus County, New York. Since his appointment in October, Dr. Bell has established relationships with professional and lay organizations, both personally and through correspondence. He has represented the Society at the annual meeting of the American Public Health Association in Kansas City, at the Conference on Health Education of the National Education Association, at the Kips Bay-Yorkville Health Center meeting, and at a conference on syphilis and gonorrhea at the New York City Board of Health.

Effective January 1, 1939, Mr. Carris will become general director of the Society, Mrs. Hathaway will continue as associate director, and Mrs. Eleanor Brown Merrill will assume the title of executive director. Mrs. Merrill's activities during the fall included participation in conferences with the Vermont Association for the Blind and the Vermont Public Welfare Department in the formulation of a co-ordinated program of prevention of blindness which may be carried out through the joint activities of these and other state agencies.

Current Articles of Interest

Nature of the Filtrable Agent of Trachoma, Phillips Thygeson, M.D., and Polk Richards, M.D., *Archives of Ophthalmology*, October, 1938, published monthly by the American Medical Association, Chicago, Ill. The authors performed 22 filtration experiments on human volunteers, monkeys, and baboons. Maximal activity of the trachomatous material was attained in five of the six successful experiments by using pooled epithelial scrapings from trachomatous Indian children. For the sixth experiment the material was obtained from an adult white person with acute trachoma. The material yielding active filtrates contained substantial numbers of epithelial cell inclusions. On the basis of the observations it is believed that the elementary bodies of trachoma are virus bodies, like those of psittacosis and inclusion blennorrhea, and that they are similar, except in staining reactions, to typical virus elementary bodies. Belief that the elementary body of trachoma represents the morphologic unit of the virus of trachoma rests principally on the following observations: (1) the identity in morphologic structure and staining reactions of the bodies of trachoma with the similar bodies of inclusion blennorrhea and psittacosis, established virus diseases; (2) the presence of the elementary bodies in the lesions of trachoma with sufficient constancy to indicate etiologic significance; (3) the presence of elementary bodies in an infective filtrate; (4) their multiplication in new hosts when transferred directly or after filtration; and (5) their persistence in the lesions of trachoma throughout its period of activity. The authors conclude that the elementary body of trachoma has the essential properties of a virus and should be classified, for the present at least, as a filtrable virus.

Accessory Factors in Refraction, Lawrence T. Post, M.D., F.A.C.S., *Guildcraft*, June–July, 1938, published bi-monthly by the Guild of Prescription Opticians of America, Philadelphia, Pa. A presentation of the many problems in refraction which may be encountered by the ophthalmologist. Cases cited include that of a

man with a 20/20 vision in his right eye and a 20/30 vision in his left eye when the eyes were used separately, whereas his vision for both eyes used together was only 20/150, indicating a tremendous convergence effort to overcome exophoria. Had the ophthalmologist neglected to test the vision with both eyes together, this essential factor might have been overlooked. Another interesting case was that of the shoe clerk who required bifocals with small segments at the top of the lenses, so that he could read box numbers on shelves above his head.

Since the ophthalmologist must take into consideration such individual peculiarities as these in addition to the factors of age, occupation, and general health, his task in prescribing lenses is by no means simple and demands an extensive background of medical training and practical experience.

Sight-Saving Classes, M. E. Smukler, M.D., *The Pennsylvania Medical Journal*, October, 1938, published monthly by the Medical Society of the State of Pennsylvania, Harrisburg, Pa. This study deals specifically with children who were referred to sight-saving classes by the Philadelphia Board of Health Eye Dispensary, and presents tables analyzing the groups of students according to the eye difficulty, sex, age, race, etc. The author particularly stresses the social and economic values of sight-saving class work.

Caustic Burns of the Eye, W. B. Hubbard, M.D., *Archives of Ophthalmology*, June, 1938, published monthly by the American Medical Association, Chicago, Ill. In recommending treatment for burns of the eye, the author suggests the free use of water and weak acids as emergency treatment; the use of an alkaline neutralizing fluid is to be avoided. For after-treatment, weak acids are valuable, particularly tannic acid. When tannic acid is used, antiseptics, such as methyl rosaniline and silver nitrate, should be used also. Agents such as atropine and compresses should be used according to the indications.

Sulfanilamide Treatment of Trachoma, Fred Loe, M.D., *Journal* of the American Medical Association, October 8, 1938, published weekly by the American Medical Association, Chicago, Ill. A

daily dose of one-fourth grain of sulfanilamide per pound of body weight was used on 140 patients at the Rosebud Indian Hospital in South Dakota, with the following results:

1. Improvement of subjective symptoms: (a) cessation of lacrimation within 24 hours; (b) loss of photophobia within 24 hours; (c) improvement of vision within 72 hours in cases of pannus.

2. Improvement of objective symptoms: (a) paling of the conjunctiva; (b) paling of the trachomatous patches and flattening of the granules and follicles; (c) resuming of the normal velvety texture of the conjunctiva at the end of two months, in cases where there had been no scarring from instrumentation; (d) greater visibility of the blood vessels of the conjunctiva after the fifth or sixth day of treatment; (e) in 30 cases of pannus, clearing of the opacity between the eighth and the fifteenth day; (f) disappearance of the granules on the lower lids.

The Ultraviolet Ray as an Eye Hazard, Van D. Rathgeber, M.D., *Texas State Journal of Medicine*, October, 1938, published monthly by the State Medical Association of Texas, Fort Worth, Texas. After surveying the literature in the field, the author comes to the following conclusions: 1. The changes found in the anterior segment of an eye following exposure to bright light are generally recognized as being due to the ultraviolet rays. 2. Changes may be brought about in the lens by both ultraviolet and infra-red rays. 3. The media of the eye, for the most part, absorb the ultraviolet and infra-red rays so that changes in the retina and choroid are attributed to the visible rays. 4. A case is reported to call attention to the disastrous results that followed exposure of an eye to the rays from an electric welding arc. The lesions manifested were typical of those produced in an eye by exposure to ultraviolet rays.

Reading Difficulties in Children, George E. Berner, M.D., and Dorothy E. Berner, B.S., *Archives of Ophthalmology*, November, 1938, published monthly by the American Medical Association, Chicago, Ill. A consideration of reading difficulties which may occur in normally intelligent children with a normal social and vocabulary development. Among the points discussed are visual immaturity, low hypermetropia, deficient fusion, and deficient fusional

convergence. Methods of correction include careful refraction and orthoptic training, as well as training in the actual process of reading under the guidance of a skilled teacher.

Changes in the Types of Visual Refractive Errors of Children: A Statistical Study, Antonio Ciocco, *Public Health Reports*, September 2, 1938, published weekly by the United States Treasury Department, Washington, D. C. This study, which is one of a series prepared for the United States Public Health Service, reveals the following results in retinoscopic examination of 1,481 white school children of Washington, D. C., who were re-examined after an average interval of 28.5 months:

1. The frequency of simple hyperopia was reduced by almost 20 per cent while that of astigmatism (hyperopic and myopic) increased by about 40 per cent, and of simple myopia by about 70 per cent.
2. Over 75 per cent of the eyes with any of the main types of refractive errors remained unchanged during the stated interval. When changes did occur, the non-astigmatic conditions (simple myopia and hyperopia) were transformed to astigmatism, while the astigmatism changed back to the simple refractive errors.
3. The chances of a change in type of refractive error appeared to decrease with increase in the age of the children.
4. The age specific incidence rate of myopia (simple and astigmatic) was highest for the children 10–11 years old at the first examination and was lowest for the children of 14 years and over. With regard to astigmatism (all forms), the age specific incidence was highest for the children 6–7 and 12–13 years old. The lowest incidence of new cases of astigmatism was also found among the children of 14 years and over.

Glaucoma: Classification, Causes, and Surgical Control, Otto Barkan, M.D., *American Journal of Ophthalmology*, October, 1938, published monthly by the Ophthalmic Publishing Company, St. Louis, Mo. In this article, which is one of a series, the author describes shallow-chamber glaucoma and reports a surgical procedure for its relief. The object of the procedure is to reduce increased intraocular pressure in a rational and safe manner by relieving the

mechanical obstruction which is its cause and restoring the physiological direction of outflow of intraocular fluid. The procedure consists of performing one to several excisions of the root of the iris (multiple sublimbal or peripheral iridectomies) in such manner that postoperative adhesions of the iris in the angle are prevented. The technique combines (1) deepening of the anterior chamber by means of physiological saline before, during, and at the end of the operation, (2) posterior sclerotomy, and occasionally aspiration of 0.5 c.c. of vitreous in order to facilitate the deepening of the anterior chamber, (3) performance of one or several successive oblique valve-like keratome incisions within corneal tissue near the limbus, (4) excision of one or several pieces of the root of the iris. Biomicroscopic examination shows the result of the procedure to be a posterior displacement of the diaphragm of the iris within the region of operation, deepening of the chamber with widening of the angle, and subsequent increased access of aqueous to the filtration angle. The effect is to reduce and prevent increased intraocular pressure in shallow-chamber glaucoma.

Binocular Vision and Orthoptic Procedure, Dorothy J. Shaad, Ph.D., *Archives of Ophthalmology,* September, 1938, published monthly by the American Medical Association, Chicago, Ill. Binocular vision is of relatively recent development in the evolutionary scale and is based on complex neurologic relations. Although the essentials for binocular vision can be isolated, the exact basis for the production and maintenance of fusion remains in the realm of theory. Clinical analysis of the anomalies of binocular vision which are associated with imbalance of the ocular muscles frequently reveals significant functional changes, including defects of the visual field (suppression scotomas), amblyopia ex anopsia, and anomalous projection. Orthoptic procedure implies the application of measures designed to correct these defects and to promote normal coordination of the ocular muscles through the training of fusional ductions. If such treatment is to be established as a routine therapeutic measure in the treatment of strabismus, the value of its contribution depends on the proper testing of binocular vision, adequate records, and careful control of other factors, such as correction of refractive errors, which form a part of the general treatment.

Book Reviews

INTRODUCTION TO PHYSIOLOGICAL OPTICS. James P. C. Southall. New York: Oxford University Press, 1937. 426 p. ill.

The works of Southall are always of particular interest to the ophthalmologist and the present volume is no exception. While there is no pretense at completeness and no effort to cover the entire field, the volume is nevertheless useful. It seems to be directed particularly to those readers who are not of the medical profession, but whose interest in psychology or optometry demands instruction in certain fields of physiological optics.

—JOHN N. EVANS, M.D.

AN INTRODUCTION TO CLINICAL PERIMETRY, Third edition. Harry M. Traquair, M.D. St. Louis: C. V. Mosby Co., 1938. 320 p. ill.

To one who has reviewed every edition of Traquair as it has come from the press it is truly a pleasure to have the opportunity of studying the present edition. The work is certainly a milestone in the progress of ophthalmology and has presented for us each secure phase of perimetry as it has evolved to real clinical usefulness. One is continually impressed with the orderly arrangement and logical sequence, with the easy style and convincing manner of the writer. The tremendous advantage of the so-called quantitative method of visual field study is well illustrated. The foreword by Dott stresses the important place which perimetry assumes as a diagnostic aid to the neurologist. Traquair has added many helpful illustrations and has inserted more detail on the anatomy of the pathway.

—JOHN N. EVANS, M.D.

DYNAMICS IN BINOCULAR DEPTH PERCEPTION. Heinz Werner, Ph.D. Columbus: Psychological Review, 1937. 127 p. ill.

This monograph should be consulted by everyone interested in depth perception, fusion, or in fact any aspect of visual physiology or psychology. The study is a technical report giving details of experiments performed in the Psychological Laboratory of the University of Michigan.

It is divided into five parts as follows: displacement and depth in half-images; displacement and depth in the Panum-pattern; depth and displacement in strobostereoscopic vision; displacement and depth in fragmentary binocular vision; displacement and the dynamics of the binocular field.

The report is technical and not designed for the beginner. It is rather heavy for the ophthalmologist, but to one particularly interested, presents much material which has a practical application.

—John N. Evans, M.D.

Nursing—An Art and a Science. Margaret A. Tracy, R.N., and Collaborators. St. Louis: C. V. Mosby Co., 1938. 560 p. ill.

As stated by Annie W. Goodrich in her foreword, "This textbook represents the combined consideration of the faculty of a school of nursing (and is in accord) with the scientific and educational concepts of the day."

As the title implies, nursing is presented here as an art and a science. This is as it should be, for the greatest need of nurses today is for increasing scientific information upon which to base practices in the development of the art.

In the field of eye health, we could wish that this presentation of scientific facts had carried further. If the placing of the bed so that the patient "can enjoy the effects of the sunshine without the discomfort of having the light directly in his face is one of the nurse's responsibilities," she needs to know the source of that discomfort.

Also, in the page devoted to prevention of blindness, we find general and optimistic statements of the progress made in this field through (a) "widespread prenatal care [which] has prevented infection of the baby's eyes in the birth canal from gonococcus and lessened the number of babies born with the defective eyesight of the syphilitic; (b) better examination of the eyes of school children [which] has resulted in the detection and early correction of conditions which, if untreated, might result in serious impairment of vision and consequent retardation; (c) sight-saving classes, better lighting facilities in the school and in the home, as well as improved teaching methods and aids [which] have done much to safeguard the eyes during the critical school years."

These optimistic statements provide little on which the nurse can evaluate a program for the prevention of blindness unless she has received other information which will give her the scientific bases for these programs. The implication seems to be that prenatal care and the use of silver salts in the eyes of the newborn are the major part of the program in prevention of blindness.

Reference is made to the nursing care in acute communicable diseases but not to the close relationship between general health and eye health nor to the fact that many systemic diseases have ocular manifestations and the significance of this fact in planning nursing care.

Treatments for eye conditions as presented include irrigations, instillation of drops, instillation of ointments, and hot and cold applications.

Testing for visual acuity is stated to be the frequent responsibility of the nurse and reference is made to the publication of the National Society for the Prevention of Blindness, "Conserving the Sight of School Children." Again the implication is that this work is done largely for school children and no mention is made of the importance of preschool vision testing.

It is to be hoped that a later edition will remedy these oversights and will integrate eye health throughout all nursing procedures.

—Eleanor W. Mumford, R.N.

Briefer Comments

Reading Aids Through the Grades. David H. Russell, Etta E. Karp, and Edward I. Kelly. New York: Bureau of Publications, Teachers College, Columbia University, 1938. 90 p.

Although this manual of reading aids is intended primarily for remedial reading, many of the suggestions will be found helpful in the general teaching of the subject, and may prove of assistance in the more important phase of teaching—that of preventing difficulties in reading.

The devices are graded according to the actual grade status of pupils and according to the reading grade of retarded pupils.

Difficulties inherent in the child include low intelligence, immaturity, physical disabilities, and temperamental and personality factors. Difficulties in environment include such factors as speak-

ing a foreign language in the home; unhappy associations; background lacking in materials; and irregular school attendance or attendance at a number of schools. Additional difficulties are defects in the school program, such as failure to give physical and mental examinations; lack of stimulating material; attempting to teach reading to large groups instead of to individuals; failure to detect and correct mistakes as they occur; and failure to give sufficient guidance and to make reading an intrinsic part of other activities.

Public Welfare in Transition. New York: Department of Public Welfare, 1937. 132 p. ill.

The New York City Department of Public Welfare presents its 1937 annual report in this attractive pamphlet, which is particularly noteworthy for the effective combination of appealing pictures and excellently organized editorial content.

Tramping to Failure. Thomas Hall Shastid, M.D. Ann Arbor: George Wahr, Publisher, 1937. 504 p. ill.

The life story of a many-sided man who "tramped" along the bypaths of learning in a loose, rambling way and arrived at a richer success than he would ever have attained by taking the smoothly paved highroad.

Occupational Experiences for Handicapped Adolescents in Day Schools. Elise H. Martens. Washington: United States Department of the Interior, Office of Education, 1938. 62 p. ill.

A consideration of the vocational training of the handicapped, based on a study of what is actually being done in a selected group of cities. The sections on the specific problems of the visually handicapped are particularly valuable for teachers of sight-saving classes.

Current Publications on Sight Conservation

Note.—The National Society for the Prevention of Blindness presents the most recent additions to its stock of publications. Except for the more expensive ones, single copies are sent free upon request. Unless otherwise specified, they are reprinted from THE SIGHT-SAVING REVIEW. New publications will be announced quarterly.

280. Prevention of Blindness from the Ophthalmologist's Point of View, Ellice M. Alger, M.D. 12 p. 10 cts. A history of the sight conservation movement from ancient times to the present day, told from the medical and sociological viewpoints.

281. Senile Cataract, Purman Dorman, M.D. 8 p. 5 cts. In simple and vivid language the author describes the development of cataract, and indicates methods of treatment.

282. Eye Health in Teacher Education. 8 p. 5 cts. Analysis of the present situation, together with recommendations of the Advisory Committee on Teacher Education, for the National Society for the Prevention of Blindness.

283. When Shadows Fall, E. K. Smith. 12 p. 10 cts. A moving account of the emotions of a cataract victim before and after a successful operation.

284. Vocational Guidance for Sight-Saving Classes, Marie C. Kniewel. 8 p. 5 cts. The author emphasizes the need for giving sight-saving class pupils the widest possible range of vocational choice.

285. A Word to the Wise—About Eyes, Booth Tarkington. 2 p. 5 cts. A well-known writer warns a young boy that the eye is a delicate object and must be safeguarded from injury in play.

Contributors to This Issue

Dr. Ellice M. Alger is a professor of ophthalmology at the New York Post-Graduate Medical School in New York City and a member of the Society's Board of Directors.

Dr. Purman Dorman, a practising ophthalmologist in Seattle, Wash., is a member of the Society's advisory committee, and is the supervising ophthalmologist of the Washington Department of Social Security.

E. K. Smith is a fictitious name assumed by a New York lawyer, who describes his experiences as a victim of cataract.

Marie C. Kniewel, who studied sight-saving class methods at Wayne University during the summer of 1937, is a teacher in the Milwaukee public schools.

Book reviewers: **Dr. John N. Evans,** associate surgeon and director of research, Brooklyn Eye and Ear Hospital; **Miss Eleanor W. Mumford, R.N.,** the Society's associate for nursing activities.

Index—Sight-Saving Review

Volume VIII: 1938

The Sight-Saving Review

Volume VIII Number 1

March, 1938

Table of Contents

The Sight-Saving Review

Volume VIII Number 2

June, 1938

Table of Contents

The Sight-Saving Review

Volume VIII Number 3

September, 1938

Table of Contents

The Sight-Saving Review

Volume VIII Number 4

December, 1938

Table of Contents